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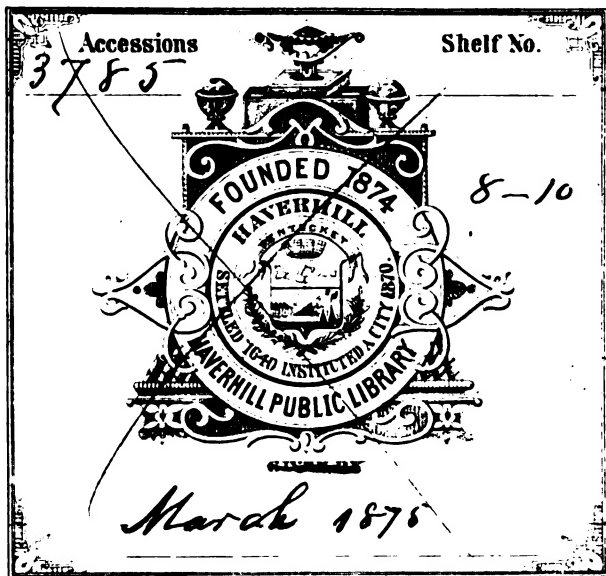
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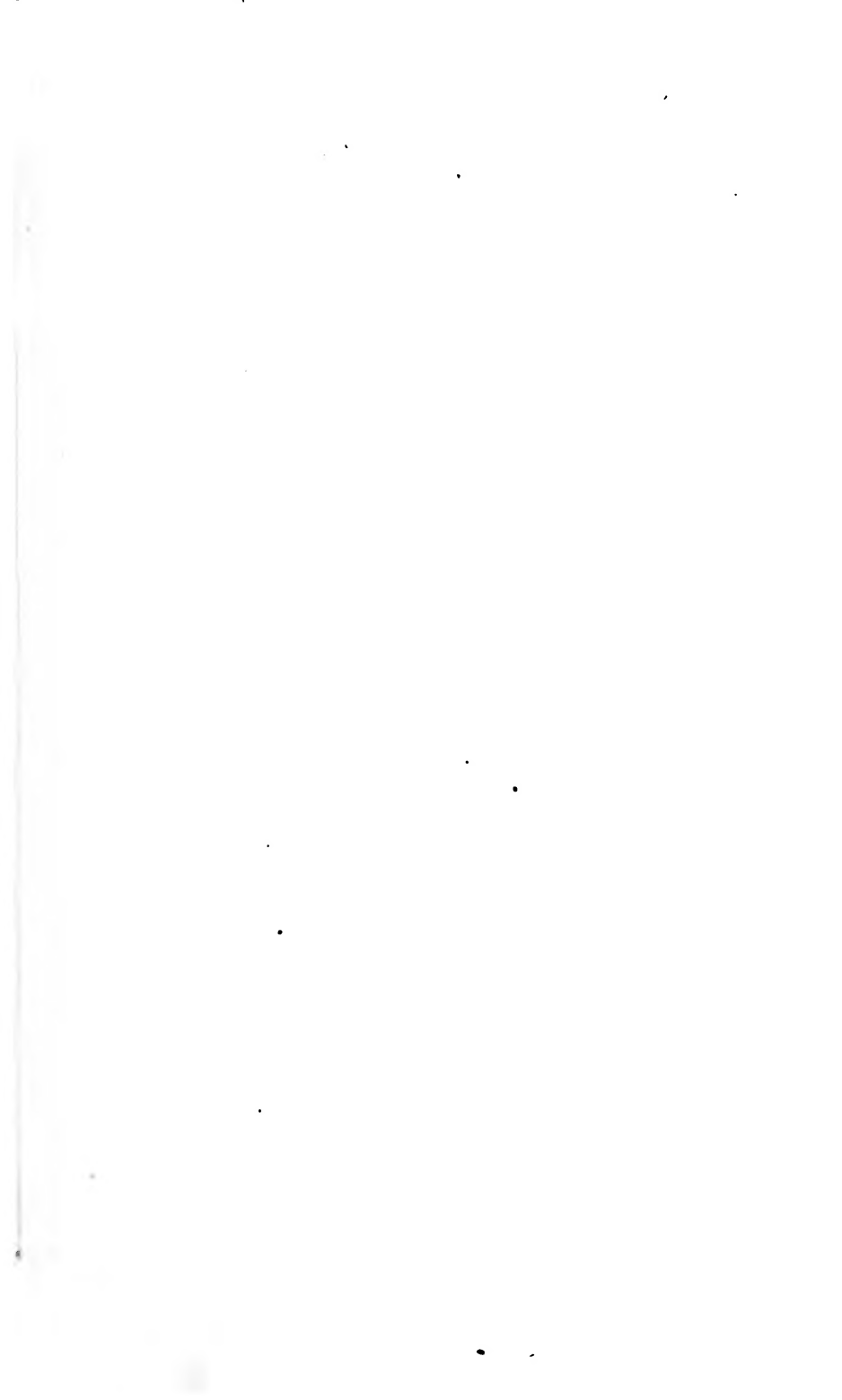
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PROCEEDINGS  
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OF  
LIVERPOOL,  
DURING THE  
FORTY-THIRD SESSION,  
1853—54.

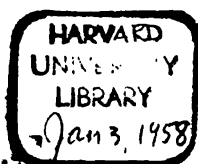
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# CONTENTS.

	Page
LIST OF MEMBERS	v
COUNCIL, Report of Session xliii., 1853-54	1
M'ANDREW, ROBERT, "On the Geographical Distribution of Testaceous Mollusca in the North-East Atlantic and Neighbouring Seas"	8
BOULT, JOSEPH, "The Most Marked Development of the Arts Promoted by War"	58
TOWSON, J. T., "On Great Circle Sailing"	66
HUME, REV. DR., "On English Dialects"	92, 175
JHNE, DR., "On the Paradise Lost of Milton"	93, 94
FERGUSON, WILLIAM, "On the Raised Beaches of the Frith of Clyde; with Notices of the Discovery of Numerous Ancient Canoes in the Neighbourhood of Glasgow"	131
BLOXAM, F. W., "On the Minor Poets of the Day"	144
FISCHEL, REV. A., "On the Life and Writings of Joost Van Vondel"	145
HUME, REV. DR., "On Heraldry"	158
COLLINS, MATTHEW, "On the Attraction of Ellipsoids considered Geometrically"	159
MOSS, REV. J. J., "On the Chemical Properties of the Torbane Hill Mineral"	159
RAMSAY, REV. A., "On the Life and Character of Hobbes"	159
Donations to the Library	178
TREASURER'S ACCOUNTS	180
Index	181
BYERLEY, ISAAC, "The Fauna of Liverpool"	Appendix.



**E R R A T A.**

**Page 93, line 27, *for* Inocenamus, *read* Inoceramus.**

**Page 158, lines 14 and 15, *for* Bloxham, *read* Bloxam.**

**Page 159, line 8, *for* Rev. J. B. Moss, *read* J. J. Moss.**

# LIST OF MEMBERS.

SESSION XLIII 1853--54.

## COUNCIL.

### President.

JOSEPH DICKINSON, M.A., M.D., F.R.S., M.R.I.A., F.L.S., &c.

### Vice-Presidents.

JOSEPH BROOKES YATES, F.S.A., M.R.G.S.

ROBERT M'ANDREW, F.R.S., F.L.S., &c.

THOMAS INMAN, M.D., F.B.S.E.

### Treasurer.

EDWARD HEATH, Esq.

### Hon. Secretary.

THOMAS SANSON, A.L.S., F.B.S.E.

### Other Members of Council:

FRANCIS ARCHER, Esq.

ISAAC BYERLEY, Esq.

JOHN HARTNUP, F.R.A.S.

Rev. J. S. HOWSON, M.A.

WILLIAM IHNE, Ph.D.

WM. LASSELL, F.R.S., F.R.A.S., &c.

J. P. G. SMITH, Esq.

DAVID PURDIE THOMSON, M.D.

JOHN THOMAS TOWSON, Esq.

## ORDINARY MEMBERS.

### Elected.

1833 Aikin, James, 1, *Goree-piazas*, and 1, *Alfred-street*.

1851 Anderson, Robert Worrall, 23, *Falkner-square*.

1841 Anderson, Thomas Francis, 3, *Cable-street*, and *Holly-lodge, Fairfield*.

1844 Archer, Francis, M.R.C.S.E., Corresp. Mem. Nat. Hist. SS. Boston and Belfast, 49, *Rodney-street*.

1853 Archer, Thomas Croxon, *Revenue-buildings and Higher Trannere*.

1854 Aspinall, John B., 1, *South John-street*, and 47, *Oxford-street*.

1854 Bahr, G. W., 4, *Cable-street*.

1834 Baines, Thomas, *Castle-street*, and *Murine-terrace, Liscaud*.

1853 Baldey, Alexander, *Baltic-buildings, Redcross-street*.

1845 Balman, Thomas, M.D. St. And., M.R.C.S.E., 4, *Oxford-street*.

1854 Banister, Rev. W., B.A. Oxon., *Mount Cemetery, Upper Duke-street*.

1851 Bean, William, *Revenue-buildings*, and 21, *Wellington-road*.

1850 Behrend, Henry, M.R.C.S.E., 15, *Canning-street*.

1854 Bennett, William, 69, *Shaw-street*.

1812 Bickersteth, Robert, Hon. F.R.C.S.E., Sen. Surg. Liverp. Infirmary, 2, *Rodney-street*.

Elected.

- 1848 Bishop, Rev. Francis, 7, *Park-road*.  
 1847 Bloxam, Fred. William, 16, *West Derby-street*.  
 1834 Boulton, Francis, Jun., 6, *Rumford-place, and Clifton-park*.  
 1835 Boulton, Swinton, 37, *Castle-street, and Heswell, Cheshire*.  
 1852 Brewer, John, Barrister-at-Law, 2, *South John-street*.  
 1844 Bright, Samuel, 1, *North John-street, and Sandheys, Mill-lane, West Derby*.  
 1851 Brougham, James Rigg, Reg. Court of Bankr., *South John-street*.  
 1849 Burke, William, *Revenue-buildings, and 36, Percy-street*.  
 1848 Byerley, Isaac, F.L.S., M.R.C.S.E., *Myrtle Cottage, Seacombe, Cheshire*.  
 1848 Casey, George, *North View, Everton-valley*.  
 1853 Cauty, Henry John, M.R.C.S.E., 31, *Norton-street*.  
 1851 Clare, John Leigh, 11, *Exchange-buildings*.  
 1844 Clay, Robert, 38, *Saint Anne-street*.  
 1853 Cohen, Douglas, M.D., 16, *Hardy-street*.  
 1850 Cox, Henry, 24, *Exchange-alley North, and Spring-bank, Walton-breck*.  
 1844 Dale, R. N., 12, *Exchange-street East, and Hill-house, Higher Tranmere*.  
 1845 Davis, George Millett, M.R.C.S.E., 78, *Rodney-street*.  
 1848 De Finance, G., 39, *North Bedford-street*.  
 1840 Dickinson, Joseph, M.A. and M.D. Trin. Coll. Dub. and Cantab., M.R.C.P.L., F.R.S., M.R.I.A., F.L.S., F.B.S.E., Lect. on Princip. and Pract. of Med. Liverp. School of Med., Phys. to Liverpool Infirmary, 5, *Nelson-street*.  
 1848 Dove, Percy M., 1, *North John-street, and 49, Hamilton-square, Birkenhead*.  
 1847 Driffield, W. W., *York-buildings, Sweeting-street, and Prescott*.  
 1848 Drysdale, John J., M.D. Edin., L.R.C.S.E., 44, *Rodney-street*.  
 1836 Duncan, William H., M.D. Edin., Medical Officer of Health, *Cornwallis-street, and Peel-terrace, Falkner-square*.  
 1833 Eden, Thomas, M.R.C.S.E., 105, *Park-road, (Dingle-hill.)*  
 1848 Edwards, John Baker, Ph. D. Gies., F.C.S., 42, *Berry-street*.  
 1844 Ellison, King, M.R.C.S.E., 30, *Rodney-street*.  
 1850 Evans, Henry Sugden, F.C.S., 1, *Seel-street*.  
 1846 Faram, John, 29, *Seel-street, and 6, Craven-terrace*.  
 1852 Ferguson, William, F.L.S., F.G.S., 18, *Royal Exchange, London*.  
 1852 Fischel, Rev. A., 4, *Great George-square*.  
 1849 Fisher, William M'Naught, Ph. D., F.R.A.S., 39, *Great George-street*.  
 1837 Fletcher, Edward, 122, *Chatham-street*.  
 1854 Fletcher, F. D., 1, *Mornington-terrace*.  
 1849 Forshaw, John, 1, *Sweeting-street*.  
 1854 Gee, Robert, M.D., 10, *Oxford-street*.  
 1853 Godden, Joseph, *Oxton, Cheshire*.  
 1844 Gray, Thomas, 1, *North John-street, and Walton-on-the-Hill*.  
 1853 Greenwood, Henry, 16, *Canning-place, and 12, Fairfield Crescent, Prospect Vale, Fairfield*.  
 1850 Hamilton, George, *Wellington-road, North Egremont*.  
 1847 Hampton, Rev. H., M.A., 18, *Upper Parliament-street*.  
 1837 Hartley, John Bernard, *Coburg Dock, and Mount Pleasant, Linacre*.  
 1850 Hartnup, John, F.R.A.S., *Liverpool Observatory*.  
 1850 Harvey, Enoch, 12, *Castle-street, and 5, Prince's-park-terrace*.

# VII.

Elected.

1841 Heath, Edward, *Orange-court, Castle-street, and St. Domingo-grove, Breckfield-road.*

1850 Hibbert, Thomas Dorning, 39, *Sackville-street, and Middle Temple, London.*

1846 Higgins, Rev. H. H., M.A. Cantab., F.O.P.S., *Rainhill.*

1836 Higginson, Alfred, M.R.C.S.E., 44, *Upper Parliament-street*

1850 Hodson, Thomas Llewellyn, M.R.C.S.E., *Islington.*

1852 Holt, Alfred, 2, *India-buildings.*

1849 Holt, George, Jun., *Fenwick-chambers, and 2, Rake-lane, Edge-hill.*

1847 Horner, Henry P., *Basnet-street, and 7, Everton-road.*

1850 Howson, Rev. John Saul, M.A. Cantab., Principal of the Collegiate Institution, 2, *Holland-place, Edge-hill.*

1847 Huggins, Samuel, 35, *South John-street, and 17, Brunswick-road.*

1841 Hume, Rev. Abraham, D.C.L. Dub., LL.D. Glasg., F.S.A., Corresp. F.S.A. Scot., M.P.S., Hon. Sec. Hist. Soc., 9, *Clarence-street, Everton.*

1851 Hunt, George, *The Brades, near Birmingham.*

1851 Hutchinson, Richard, M.R.C.S.E., *Upper Stanhope-street.*

1850 Ihne, William, Ph. D. Bonn, 6, *Carlton-terrace, Upper Parliament-street.*

1844 Inman, Thomas, M.D. Lond., M.R.C.S.E., F.B.S.E., Lect. on Mat. Med. and Med. Jurisp. Liverp. Sch. of Med., 16, *Rodney-street.*

1844 Jevons, William, *Devonshire-terrace, Birkenhead.*

1854 Jones, John, 55, *Rodney-street.*

1852 Jones, Morris Charles, 75, *Shaw-street.*

1851 Jones, Roger Lyon, *Great George-square.*

1853 Keates, John, 2, *Canning-street.*

1846 King, Joseph, Jun., 3, *Union-court, and 59, Shaw-street.*

1854 Kirwan, Chas., *Southern Hospital, Greenland-street.*

1848 Lamport, William James, *Fenwick-chambers, and Rock-ferry.*

1839 Lassell, William, F.R.S., F.R.A.S., 20, *Milton-street.*

1852 Lassell, William, Jun., 20, *Milton-street.*

1844 Lear, John, 1, *North John-street, and 11, Holland-terrace, Edge-hill.*

1854 Lidderdale, William, 42, *Canning-street.*

1844 Lord, William, Lieut. R.N., *Revenue-buildings, and 16, Sandon-street.*

1834 M'Andrew, Robert, F.R.S., F.L.S., 84, *Upper Parliament-street.*

1852 Macleod, Norman, *Sailors' Home, and 8, Peel-street.*

1853 McNicholl, Thos., 32, *Crown-street.*

1822 Macrorie, David, M.D. Edin., M.R.C.S.E. and Ed., 126, *Duke-street.*

1853 Marrat, F. P., 15, *White Mill-street.*

1848 Marshall, Buchanan, M.D. Glasgow, 29, *Islington-terrace.*

1839 Martin, Studley, *Exchange-chambers, and 3, Chesterfield-street.*

1844 Mayer, Joseph, F.S.A., 68, *Lord-street.*

1854 Melly, George, 5, *Bedford-place, Bedford-street South.*

1853 Milner, Rev. J. W., M.A., 1, *Devonshire-terrace, Upper Parliament-street.*

1849 Moss, Rev. John James, B.A., *Otterspool.*

1850 Mott, Albert J., *South Castle-street, and Grove-park, Lodge-lane.*

1854 Mott, C. G., 9, *Exchange-alley North.*

1834 Neill, Hugh, F.R.A.S., L.R.C.S.E., 115, *Mount-pleasant.*

1851 Newlands, James, Borough Engineer, *Cornwallis-street, and Lodge-lane.*

1847 Nisbet, William, L.F.P. and S.G., *Church-street, Egrenont.*

1853 Pearse, W. H., M.D., 1, *Upper Parliament-street.*



Elected.

- 1846 Picton, James A., F.S.A., 19, *Clayton-square, and Sandy-knowe, Wavertree.*
- 1853 Porter, Rev. James, B.A., *Collegiate Institution.*
- 1854 Prange, F., *Grove-park, Lodge-lane.*
- 1850 Ramsay, Rev. Arthur, M.A. Cantab., *Hayman's Green, West Derby.*
- 1844 Ramsay, Peter, M.D. St. And., F.R.C.P.E., M.R.C.S.E., Surg. R.N., 69, *Chatham-street.*
- 1812 Rathbone, Richard, 24, *Water-street, and Woodcote, Aigburth-road.*
- 1812 Rathbone, William, 24, *Water-street, and Green-bank, Wavertree.*
- 1851 Redish, Joseph Carter, 5, *Falkner-street.*
- 1854 Rees, William, 2, *West Derby-street.*
- 1854 Rigge, Thomas, 64, *Rodney-street.*
- 1840 Robberds, Rev. John, B.A., *High-park-street, Toxteth-park.*
- 1853 Rowe, James, 2, *Chapel-walks.*
- 1850 Ryder, James O., 1, *Fenwick-street, and 39, Falkner-square.*
- 1836 Salt, Charles Fred., Hon. Sec. Liverpool Polytech. Society, 88, *Upper Canning-street.*
- 1845 Sansom, Thomas, A.L.S., F.B.S.E., Local Sec. Bot. Soc., London. *Revenue-buildings, and 7, Everton-road.*
- 1846 Scholfield, Henry Daniel, M.D. Oxon, M.R.C.S.E., 14, *Hamilton-square, Birkenhead.*
- 1853 Shain, James Miller, M.R.C.S., 4, *Monument-place, London-road.*
- 1812 Smith, James Houlbrooke, 28, *Rodney-street, and Green-hill, Allerton.*
- 1848 Smith, J. P. G., *Borough Bank, Water-street, and Spring-bank, Breck-road.*
- 1850 Smith, R. C., *Church-street, Birkenhead.*
- 1853 Somers, John Augustus, L.R.C.S.E., &c., 17, *Hunter-street.*
- 1842 Taylor, Robert Hibbert, M.D. Edin., L.R.C.S.E., F.B.S.E., Lect. on Ophthalm. Med. Liverp. Sch. Med., *Percy-street.*
- 1849 Thomson, David Purdie, M.D. Edin., L.R.C.S.E., 4, *Salisbury-street.*
- 1812 Thorneley, Thomas, M.P., 8, *Mount-street.*
- 1844 Thorneley, Francis, 9, *Exchange-alley, and 16, Hope-street.*
- 1851 Towson, John Thomas, *Sailors' Home, and 23, Great George-square.*
- 1844 Turnbull, James, M.D. Edin., Phys. Liverp. Infirm., 4, *Mornington-terrace.*
- 1844 Vose, James Richard White, M.D. Edin., Sen. Phys. Liverp. Infirmary, 5, *Gambier-terrace.*
- 1844 Walmsley, Joshua, *Lord-street.*
- 1849 Watling, John William Henry, M.R.C.S.E., *Wavertree.*
- 1844 Winstanley, Samuel, *Church-street, and 68, Mount-pleasant.*
- 1836 Yaniewicz, Felix, 60, *Mount-pleasant.*
- 1812 Yates, Joseph Brooks, F.S.A., M.R.G.S., M.P.S., 25, *King-street, and West Dingle.*
- 1834 Yates, Richard Vaughan, 31, *Brunswick-street, and The Shrubbery, Toxteth-park.*

## CORRESPONDING MEMBERS.

Elected.

- 1812 Rev. Francis Parkman, *Boston, U.S.*  
 1812 Peter Mark Roget, M.D. Edin., F.R.C.P., F.R.S., F.G.S., F.R.A.S.,  
 F.R.G.S., &c., *London.*  
 1813 Very Rev. William Buckland, D.D. Oxon., F.R.S., F.L.S., F.G.S.,  
 F.R.G.S., Hon. F.C.P.S., Dean of Westminster, *Deanery, West-*  
*minster.*  
 1814 Alexander Blair, L.L.D., *London.*  
 1815 Benjamin Smith Barton, M.D., *Philadelphia.*  
 1816 Thomas Stackhouse.  
 1816 George Cumming, M.D., Edin., L.R.C.P., *Denbigh.*  
 1816 John Wakefield Francis, M.D., *Bond-street, New York.*  
 1817 John Bradbury, *New York.*  
 1817 George Cantrell, *Eaton.*  
 1818 Willis Earle, *Calcutta.*  
 1819 John Stanley, M.D., Edin., *Whitehaven.*  
 1819 and 1825 Rev. W. Scoresby, D.D., F.R.S.S.L. and E., &c., &c.  
 1820 Joseph Carne, F.R.S., M.R.I.A., F.G.S., &c., *Penzance, Cornwall.*  
 1823 John Reynolds.  
 1824 Rev. H. Jones.  
 — James Thomson, *Mexico.*  
 1827 Rev. William Hincks, F.R.S.E., F.L.S., F.B.S.E., *Queen's College, Cork.*  
 1828 Rev. Brook Aspland, *Duckinfield, Cheshire.*  
 1831 Charles Pope, *Portishead, Bristol.*  
 — John Ashton Yates, M.R.G.S., *Bryanston-square, London.*  
 1833 Professor Traill, M.D. Edin., F.R.C.P.E., F.R.S.E., F.G.S., &c.,  
*Edinburgh.*  
 1833 Earl of Harrowby, P.C., D.C.L., *Sandon-hall, Staffordshire.*  
 1833 James Yates, M.A., F.R.S., F.L.S., F.G.S., &c., *Lauderdale-house,*  
*Highgate, London.*  
 1834 William Macdowall Tartt.  
 1835 George Patten, A.R.A., *London.*  
 1835 William Ewart, M.P., *Cambridge-square, Hyde-park, London.*  
 1835 Henry, Lord Brougham and Vaux, M.A., F.R.S., &c., &c., &c.  
 1835 Francis, Earl of Ellesmere, D.C.L., F.G.S., F.L.S., F.S.A., &c., *London.*  
 1835 Samuel Angell, *Gower-street, Bedford-square, London.*  
 1836 H. B. Robinson, *London.*  
 1836 Chevalier de Kirkhoff, *Antwerp.*  
 1837 Earl of Burlington, M.A., LL.D., F.R.S., M.R.I.A., F.G.S., F.R.G.S.,  
 F.C.P.S., F.Z.S., &c., *Belgrave-square, London.*  
 1838 Professor Airey, M.A., D.C.L., F.R.S., Hon. F.R.S.E., Hon. M.R.I.A.,  
 F.R.A.S., F.C.P.S., &c., Astronomer Royal, *Greenwich.*  
 1840 James Naysmith, *Patricroft.*  
 1840 Richard Duncan Macintosh, L.R.C.P., *Exeter, Devonshire.*  
 1841 Charles Bryce, M.D., Glasg., Fell. F.P. and S.G., Socio dell' Accad.  
 de Lin. Roma., *Ludlow.*

- 1842 J. W. Dixon, *Cape of Good Hope*.  
 1844 George Chater, *Norwich*.  
 1844 J. B. Jukes, M.A., F.R.S., F.G.S., Local Director of the Geological Survey of Ireland, *Dublin*.  
 1844 Professor Edward Forbes, F.R.S., F.G.S., F.L.S., Hon. F.C.P.S., *University, Edinburgh*.  
 1844 T. B. Hall, *Coggeshall, Essex*.  
 1844 Peter Rylands, *Warrington*.  
 1844 Professor Scouler, M.D., *Royal Society, Dublin*.  
 1844 Professor T. Rymer Jones, F.R.S., F.Z.S., F.L.S., M.R.C.S.E., &c., *King's College, London*.  
 1844 W. H. White, M.B.S., *London*.  
 1844 Robert Patterson, *Belfast*.  
 1844 Signor L. Bellardi, *Turin*.  
 1844 Signor Michelotti, *Turin*.  
 1844 M. L. Phillips, *Brighton*.  
 1844 Thomas Bell Salter, M.D. Edin., M.R.C.S. Eng. and Edin., F.L.S., F.B.S.E., *Ryde, Isle of Wight*.  
 1844 Professor Alger, *Boston, U.S.*  
 1844 Sir Charles Lemon, Bart., M.A. Cantab., F.R.S., F.G.S., *Cardew, Cornwall*.  
 1844 Il Cavaliere Carlo Passerini, *Pisa*.  
 1844 Professor William Carpenter, M.D., Edin., M.R.C.S.E., F.R.S., F.G.S., *London University*.  
 1846 Rev. Professor Baden Powell, M.A., Oxon, F.R.S., F.R.A.S., F.G.S., &c., *Oxford*.  
 1847 Sir William Rowan Hamilton, LL.D., Hon. F.R.S.E., M.R.I.A., F.R.A.S., F.C.P.S., Hon. F.C.P.S., &c., Astronomer Royal of Ireland, *Dublin*.  
 1849 Thomas Nuttall, F.L.S., *Rainhill, Lancashire*.  
 1849 Rev. Thomas Corser, M.A., *Stand, Bury*.  
 1850 Rev. St. Vincent Beechey, M.A. Cantab. *Worsley, near Eccles*.  
 1851 James Smith, F.R.S.S.L. and E., F.G.S., *Jordan-hill, Glasgow*.  
 1851 Henry C. Pidgeon, *Putney College, and 37, Berners-street, London*.  
 1851 Rev. Robert Bickersteth Mayor, M.A. Cantab. Fell. St. John's. Cantab., F.C.P.S., *Rugby*.  
 1851 George Johnston, M.D. Edin., LL.D. Aberd., F.R.C.S.E., *Berwick-upon-Tweed*.  
 1852 Thomas Spencer, *London*.  
 1852 William Reynolds, M.D., *Coed-du, Denbighshire*.  
 1853 Rev. James Booth, LL.D., F.R.S., &c., *Wandsworth, Surrey*.
-

P R O C E E D I N G S  
OF THE  
L I T E R A R Y   A N D   P H I L O S O P H I C A L   S O C I E T Y  
O F   L I V E R P O O L .

---

SESSION FORTY-THREE, 1853-4.

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FIRST MEETING.

ROYAL INSTITUTION.—October 17, 1853.

JOSEPH DICKINSON, M.D., F.L.S., &c., PRESIDENT, in the Chair.

The SECRETARY read the following Report of the retiring Council :—

In surrendering their trust into the hands of the members, the Council cannot but congratulate the Society on the successful termination of the Forty-second Session.

During the past Session the following gentlemen have been added to the list of ordinary members: namely, Rev. A. Fischel, Messrs. William Lassell, jun., John Brewer, Wm. Ferguson, Henry J. Cauty, Morris C. Jones, F. P. Marrat, Dr. D. Cohen, Mr. James Rowe, and Rev. J. W. Milner; and the name of Mr. William Jevons has been transferred from the list of corresponding to that of ordinary members.

The Council have to regret the removal, by death, of Mr. Edward Hebson.

Resignations have been received from the following gentlemen: namely, Messrs. F. Brent, John Conway, Henry Curry, S. M. South, Dr. Trench, Dr. M'Naught, and Mr. John Wybergh, jun.

The names of Messrs. Robert Rockliff, R. B. Reid, E. B. Spence, C. J. Ross, Dr. Parr, and Dr. R. H. Brett, have been removed from the list of members under the operation of the second law, which provides that, "if any member shall omit to pay his subscription for three consecutive years, his connexion with the Society shall cease."



The Society now numbers 199 members; namely, 183 ordinary, and 66 corresponding.

During the session the following papers, many of which are of great interest, have been read, namely:—

“On Time-balls and Sympathetic Clocks,” by Mr. Hartnup.

“On some Greek Inscriptions at Ince Blundell,” by Mr. Yates.

“On the Earthquake of the 9th Nov., 1852,” by Mr. J. P. G. Smith.

“On the Coffees of Commerce,” by Mr. H. S. Evans.

“On the true Mythological Conception of Janus,” by Dr. Ihne.

“On the Rheno-Danubian barrier of the Roman Empire,” by Mr. James Yates.

“An Account of an Explosion in a Granite Quarry at the village of Furnace, on the western shore of Loch Fine,” by Mr. John James Moss.

“On the Trustworthiness of the Account respecting the Regal Period of the Roman History,” by Dr. Ihne.

“Who was Macbeth?” by Dr. Hume.

“On the Occurrence in this Country of *Bombycella Carolinensis*, *Bombycella garrula*, and *Merops Apiaster*,” by Mr. W. Ferguson.

“On the Practical Application of Comparative Philology,” by the Rev. Arthur Ramsay.

“On the Deviation of the Compass on board Iron Steamers proceeding to the Southern Hemisphere,” by Mr. Towson.

“Architecture and Nature,” by Mr. Samuel Higgins.

“On the History of Nautical Terms,” by the Rev. J. S. Howson.

“On the Fall of an Aërolite in Corrientes, one of the Argentine Provinces, in January, 1844,” by Mr. H. E. Symonds.

“On the History, Present Position, and Future Prospects of the Literary and Philosophical Society,” by Dr. Hume.

“Results of Meteorological Observations taken at the Liverpool Observatory during the two years ending December, 1852,” by Mr. Hartnup.

“On the General Character of Storms which pass over the British Isles, with some Practical Suggestions, by which the damage occasioned by them may be diminished,” by Mr. W. Stevenson.

Donations to the Library have been received from the following individuals and Societies, namely:—The Right Hon. Lord Lonsborough, the Rev. Dr. Hume, Mr. Sansom, the Rev. Dr. Booth, Dr. Turnbull, Messrs. Chambers, Royal Society of Edinburgh, Liverpool Architectural and Archæological Society, Committee of the Salford Free Library, Committee of the Liverpool Free Public Library, Royal Astronomical Society, Society of Arts, Historic Society of Lancashire

and Cheshire, Royal Institution of Great Britain, Literary and Philosophical Societies of Hull and Manchester, Royal Irish Academy, and the Peace Conference Committee.

The Council refer with great pleasure to two resolutions passed by the Society during the early part of the session.

1st. "That Visitors be admitted at the commencement of the meeting."

2nd. "That the privilege of attending the public meetings be given to the presidents and secretaries, *ex officio*, of such societies as meet in the Royal Institution, or may be approved by the Society."

In accordance with the last mentioned regulation, the Society, on the recommendation of the Council, invited the attendance, at our meetings, of the President and Secretary of the Polytechnic Society, Architectural and Archæological Society, Historic Society of Lancashire and Cheshire, and the Chemists' Association.

This has been most gracefully acknowledged by these societies, and the same privilege has been extended to the officers of this society in return.

Your Council are fully aware of the desirableness of encouraging that friendly feeling which now exists between the learned Societies of the town, and in order to cultivate it more fully, the Council are of opinion that, when papers of public or general interest are to be brought before this Society, they should be authorized to invite the members of other Societies and the public to attend the meeting.

Invitations of this nature were received during the Session from the Historic Society of Lancashire and Cheshire, to attend a day meeting on the 5th May, and also from the Chemists' Association, to attend the exhibition, by Mr. Staite, of the Electric Light, in the Theatre of the Royal Institution, on the 29th April.

Both these invitations were gladly accepted by the members of this Society, and the meetings were numerous attended.

The Council refer with satisfaction to a most agreeable re-union of the Societies at the celebration of the centenary of the birthday of William Roscoe, on the 8th March last. On this occasion the members of the learned Societies of the town, with their friends, met together (1,200 in number), at a public breakfast in the Philharmonic-hall, under the presidency of the Right Hon. the Earl of Sefton, Lord-Lieut. of the County, when we were also honoured with the presence of our excellent Chief Magistrate, the Lord Bishop of the Diocese, and other distinguished visitors.

The opening of the valuable museum presented to the town by the Earl of Derby followed, and the day's proceedings closed with an

elegant entertainment, given by his Worship the Mayor, at the Town Hall.

The Council congratulate the members on the determination of the British Association to hold its next meeting in this town, and they feel assured that nothing will be wanting on the part of the members of the Society and its officers to contribute to the comfort of the distinguished visitors that may be expected in Liverpool on that occasion ; and that every endeavour will be made to carry out such arrangement as shall make the meeting worthy of this town.

During the recess, the publication of the Proceedings has advanced, but the Council regret that, owing to unforeseen circumstances, respecting the printing, over which they had no control, they are unable to present the entire volume in type this evening. The volume, however, will be in the hands of the members in the course of a few weeks.

The Council cannot allow this opportunity to pass without expressing to the members the gratification they feel in being able to state that, inasmuch as every former volume has excelled its immediate predecessor, so will the present one excel the last, both in value of matter and in illustrations.

The Council being anxious that the Society should still exercise its functions with unimpaired efficiency, appointed a sub-committee from its own body, to consider the state of the finances, and to report to the council upon the following points ; namely, the propriety of raising the subscriptions ; the formation of different classes of subscribers ; on life subscriptions ; on compositions ; upon the continuance of the practice of giving tea, coffee, &c., and sending out circulars ; on the payment for the transactions, for the tea and coffee ; and such other points as they may consider to bear upon the subject ; and the Council beg to lay before the Society their Report, which is as follows :

"The Sub-Committee are of opinion that it is desirable the Society should make the following alterations with reference to the above subjects, namely :—

"That the subscriptions payable by ordinary members be increased to £1 1s., with an entrance fee of 10s. 6d. as at present ; and that life members be admitted at £10 10s., without entrance fee. That the present members of the Society, and all proposed as members prior to the adoption of any alteration in the subscription, be allowed to compound for their future annual subscriptions by the payment of £5 5s., provided the same be done during the Session 1853-54.

"The Sub-Committee are also of opinion that tea and coffee, and

circulars, should be continued; and, also, that the transactions should be published as heretofore."

It was moved by the Rev. Dr. HUME, and seconded by Mr. JOSEPH BOULT—

"That the Report be adopted, with the exception of that part containing a recommendation to increase the amount of annual subscription."

Amendment moved by Dr. DUNCAN, and seconded by Mr. J. B. YATES—

"That the Report of the Council be received; and that the consideration of the increase of subscription be considered at a future meeting, to be called as soon as the laws will admit."—Amendment carried.

The TREASURER'S Accounts were then read and passed.—(*Vide Appendix.*)

The Society then proceeded to ballot for the new members of Council, three Vice-Presidents, a Treasurer, and a Secretary. At the conclusion, the Officers of the Society were announced as follows:—

*President.*

JOSEPH DICKINSON, M.A., M.D., M.R.I.A., F.L.S., &c.

*Vice-Presidents.*

JOSEPH BROOKS YATES, Esq., F.S.A., M.R.G.S.

ROBERT McANDREW, F.R.S., F.L.S., &c.

THOMAS INMAN, M.D., F.B.S.E.

*Treasurer.*

EDWARD HEATH, Esq.

*Hon. Secretary.*

THOMAS SANSOM, A.L.S., F.B.S.E.

*Other Members of Council.*

FRANCIS ARCHER, Esq.

ISAAC BYERLEY, Esq.

JOHN HARTNUP, F.R.A.S.

REV. J. S. HOWSON, M.A.

WILLIAM IHNE, Ph.D.

WILLIAM LASSELL, F.R.S., F.R.A.S.

J. P. G. SMITH, Esq.

DAVID PURDIE THOMSON, M.D.

JOHN THOMAS TOWSON, Esq.

The Rev. Dr. HUME moved a vote of thanks to the retiring Council and Officers, which was carried unanimously.

Mr. ALEXANDER BALDEY, Mr. JOHN AUGUSTUS SOMMERS, and Mr. JAMES MILLER SHAIN were elected Ordinary Members.

The Rev. JAMES BOOTH, LL.D., F.R.S., &c., was elected a Corresponding Member.

The SECRETARY read the following recommendation from the Council, viz.:—"That the form of Application for admission be altered, by leaving out the words—"and to furnish, when called for, the title of a paper to be read in the Society." It having been put from the chair, was carried unanimously.

The SECRETARY read a letter from Mr. Abraham, Honorary Secretary of the Chemists' Association, inviting the members of the societies which meet at the Royal Institution, and also those of the Historic Society and the Liverpool Academy, to attend a lecture on the new Crystal Palace at Sydenham, to be delivered by Mr. T. C. Archer, at the Royal Institution, on Friday evening next.

Resolved unanimously—"That the thanks of the Society be presented to the Chemists' Association."

The SECRETARY read a letter from Mr. Boulton, dated the 14th of October, 1853, inclosing copies of the undermentioned resolutions, passed at a meeting of gentlemen, members of two or more of the local learned societies, publishing transactions, convened by circular, and held in the Library of Mr. Mayer's Egyptian Museum, on Thursday evening, the 13th instant, Edward Heath, Esq., in the chair, viz.:—

1st. "That it appears to this meeting that an union of the following societies, viz., the Literary and Philosophical, the Polytechnic, the Architectural and Archæological, and the Historic Society of Lancashire and Cheshire, is in many respects highly desirable."

2nd. "That, to obtain a full and deliberate consideration of the whole subject, we respectfully request each of the four societies to appoint representatives, not exceeding five, to deliberate together, and to prepare a Report, to be submitted to the societies respectively."

3rd. "That, Mr. Thomas Brakell having offered to print 1,000 copies of the Report, when ready, for presentation to the members of all the Societies, the best thanks of this meeting be presented to Mr. Brakell, and his liberal offer be accepted."

Mr. FORSHAW gave notice that he would move the consideration of the subject at the next meeting.

The CHAIRMAN having alluded to the intended visit of the British Association to Liverpool next year, it was moved by Mr. J. B. YATES, seconded by Dr. HUME, and carried unanimously—

"That this Society pledges itself to co-operate most cordially in securing the success of the meeting of the British Association."

Mr. ISAAC BYERLEY exhibited a fine specimen of the *Torpedo nobiliana*, which was caught by some fishermen in Carnarvon Bay, on Saturday last. The fish is rarely met with, and (when in a living state) is capable of giving very severe electrical shocks.

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## SECOND MEETING.

ROYAL INSTITUTION, October 31, 1853.

JOSEPH DICKINSON, M.D., F.L.S., &c., PRESIDENT, in the chair.

At an EXTRAORDINARY MEETING, held this evening, the recommendation contained in the last Annual Report of the Council, "That the subscription payable by Ordinary Members be increased to £1 1s., with an entrance fee of 10s. 6d., as at present, and that Life Members be admitted at £10 10s., without entrance fee:—That the present members of the Society, and all proposed as members prior to the adoption of any alteration in the subscription, be allowed to compound for their future annual subscriptions by the payment of £5 5s., provided the same be done during the Session 1853-54;"—was taken into consideration: when it was moved by Mr. J. FORSHAW, and seconded by Mr. A. J. MOTT—"That the subscription payable by Ordinary Members be increased to £1 1s. for the present Session."—Carried.

Dr. J. B. EDWARDS exhibited Photographs of the *Torpedo nobiliana*, taken from a specimen lately caught in Carnarvon Bay.

Mr. J. B. YATES exhibited the Victoria Nuggett, from Australia.

The following recommendation from the Council was read and adopted by the Society, viz.:

"That the Society be recommended, in an address to the Town Council, to suggest the propriety of associating with the Library Committee some members from the Councils of the Learned Societies."

The following paper was read by ROBERT McANDREW, Esq., F.R.S., F.L.S., &c.

# ON THE GEOGRAPHICAL DISTRIBUTION OF TESTACEOUS MOLLUSCA IN THE NORTH-EAST ATLANTIC AND NEIGHBOURING SEAS.

The distribution of marine mollusca is a subject, not only interesting to the student of zoology and physical geography, but particularly so to the geologist, as by reference to it he is enabled to form an opinion of the climatal and other conditions that must have prevailed at the time when those strata were deposited, which contain fossils allied to existing forms.

Although shells, as objects of beauty and rarity, have long excited the cupidity of collectors, it is comparatively only of late years that qualified individuals have been found to investigate and record local *faunas*, and that the commanders and officers of exploring and surveying expeditions have been stimulated to take advantage of the opportunities within their reach of illustrating the natural history of remote regions, whereby the philosophic naturalist has been enabled to form a much more correct idea of the range and distribution of this class of animals, and how far the same is affected by temperature and other circumstances, than he could have derived from the grossly erroneous data supplied by many of the older writers on conchology.

Very much, however, still remains to be accomplished in this direction. The great sea, in which are "things creeping innumerable," is still the region of mystery; and people term it the "waste of waters," little reflecting how those waters teem with myriads of living beings; and that, even after its vast extent is taken into account, the ocean is pre-eminently the domain of animal, as the land is of vegetable, organization.

That there should be found those who still believe in the existence of sea serpents, mermaids, and other monsters, whose terrestrial brethren, the griffins and unicorns, have long since been banished to the realms of romance and of heraldry, proves the ignorance which exists concerning the things of the sea; while we need but to compare the extent of our knowledge of marine and of land animals, in order to perceive at once what a field is here presented to the lover of nature for research of the most pleasing and interesting kind, and for adding to our knowledge of the manifold works of the Creator.

These and similar considerations have induced me to direct my

attention to the exploring of the bottom of the sea, commencing with our own coasts, and occasionally extending my excursions to those of neighbouring countries. In laying before the Society some of the results of my investigations, I may be allowed to mention, as an evidence that they have not been altogether fruitless, the fact, that the marine fauna of the Canary Islands had been represented to be of African type, but is proved by me to be much more closely allied to that of the Mediterranean; and, in consequence, the line, marking on a physical map the limit of the tropical fauna, has had to be altered from the north to the south of those islands.

There exists a considerable analogy between the distribution of animals (particularly those which, in consequence of a lower organization, enjoy but very limited power of locomotion,) and of plants. The fauna, as well as flora, of the arctic and antarctic regions being poor in genera and species, but rich in the number of individuals, while the tropics furnish the greatest variety of form in both departments. Also, similar conditions in distant parts of the world present representative, but not identical, species and genera, both in the animal and vegetable kingdoms; and, although the region of Australasia would appear at first sight to form an exception to this rule, a closer observation will shew that its real peculiarity consists in its representing a more ancient state of things, such as may probably have existed in other parts of the world at some period prior to the creation of man.

This view is, I believe, borne out by the general character of the plants and vertebrate animals, whilst among the mollusca may be quoted the characteristic genus *Trigonia*, not met with elsewhere in a living state, but largely represented in the oolites of this country.

It is well known with respect to land vegetation, that a difference of elevation compensates for difference of latitude, and that arctic forms are repeated in the same or similar species on the lofty mountains of the temperate and even of the torrid zones. It might be supposed that the analogy would hold good with respect to the marine mollusca, but such is the case only to a very small extent. The temperature of the ocean, at great depths, being uniform in all latitudes at about 40 degrees of Fahrenheit,\* it is very evident, that although the inhabitant of shallow seas in temperate regions may, by descending to a greater depth, procure a similar average temperature either in higher or lower latitudes, the same resource would not be available to the natives of

\* Captain Denham states, that at 200 fathoms it averages 50° and 52°, no matter what the surface temperature may be; and below that depth, diminishes till it reaches the minimum of 40° at 900 to 1000 fathoms.



extreme climates. It is also necessary to bear in mind, that a suitable temperature is not the only condition necessary to the existence of animals, and that at the moderate depth (compared with the height of mountains) of 600 fathoms, there must exist total darkness, and a pressure equal to 120 times that of our atmosphere, or about 1800 pounds to the square inch; a state of things which we cannot imagine to be very convenient, even if it be not absolutely opposed, to animal existence.

As the depths of the sea are influenced by climate in an inverse ratio to their distance from the surface, till the point of an unvarying temperature is reached, it is evident that difference of latitude must be of much less importance to those beings which inhabit the deep sea, than to shallow water species, and we accordingly find the former to be more extensively distributed than the latter. A considerable variation, as regards the distribution of mollusca, takes place between the opposite sides of the north Atlantic. On the eastern shores, intervening between those of the arctic and tropical regions, are two distinct faunas, which have been termed the Celtic, and the Lusitanian or Mediterranean; and these so run into one another, that it would be difficult to fix upon an exact line as the commencement or termination of either of them. On the American shores, species generally characteristic of the arctic seas extend southward as far as Cape Cod in lat. 42° (the parallel of the north of Portugal), where they are said to disappear abruptly, and to be replaced by genera including *Pyrula*, *Ranella*, and *Columbella*, evidently forms of a more southern type, and which appear to represent those constituting the Lusitanian fauna on this side of the Atlantic.

Dr. Philippi has appended to his admirable work, on the Mollusca of Sicily, a comparison of the fauna of that country with the faunas of all the principal districts and localities of which there had been any list of shells published. I have considered that it would not be uninteresting to follow his example within a narrower sphere, by comparing together the shells of those parts which I have personally examined and some others of a similar character, with a view of illustrating the range of northern species southward, and likewise of southern species towards the north. I commence with

#### WESTERN SCANDINAVIA.

In a catalogue of the Mollusca of Western Scandinavia, published by Professor Lovén, of Stockholm, there are, after rejecting a few

which prove to be synonyms, 289 species provided with shells, consisting of—

<i>Acephala lamellibranchiata</i> .....	124
<i>Acephala palliobranchiata</i> .....	5
<i>Pteropoda</i> .....	3
<i>Gasteropoda prosobranchiata</i> .....	136
<i>Gasteropoda opisthobranchiata</i> .....	21

Of these the following are found in North America, being taken principally from Dr. Gould's catalogue of the Mollusca of Massachusetts:—

ACEPHALA LAMELLI- BRANCHIATA.			
<i>Teredo navalis</i>	<i>Leda pygmaea</i>	<i>Trochus (Margarita) heli-</i>	
<i>Pholas crispata</i>	<i>Peten Islandicus</i>	<i>licinus</i>	
<i>Saxicava arctica</i>	<i>Anomia aculeata</i>	<i>Littorina rudis</i>	
„ <i>rugosa</i>		„ <i>tenebrosa</i>	
<i>Mya arenaria</i>	ACEPHALA PALLIO- BRANCHIATA.	<i>Lacuna vineta</i>	
„ <i>truncata</i>		„ <i>puteolus</i>	
<i>Panopæa Norvegica</i>	<i>Hippothyris psittacea</i>	<i>Scalaria Greenlandica</i>	
<i>Solen ensis</i>	<i>Terebratula caput ser-</i>	<i>Natica clausa</i>	
<i>Tellina proxima</i>	<i>pentis</i>	„ <i>pusilla</i>	
<i>Cyprina Islandica</i>	GASTEROPODA PROSO- BRANCHIATA.	„ <i>helicoides</i>	
<i>Lucina borealis</i>		<i>Velutina lævigata</i>	
„ <i>flexuosa</i>	<i>Chiton albus</i>	<i>Lamellaria perspicua</i>	
<i>Turtonia minuta</i>	„ <i>asellus</i>	<i>Trichotropis borealis</i>	
<i>Astarte sulcata</i>	„ <i>marmoreus</i>	<i>Admeta crispa</i>	
<i>Mytilus edulis</i>	„ <i>ruber</i>	<i>Purpura lapillus</i>	
<i>Modiola modiolus</i>	„ <i>cinereus</i>	<i>Buccinum undatum</i>	
<i>Crenella discors</i>	<i>Acmæa testudinalis</i>	<i>Fusus antiquus</i>	
„ <i>decussata</i>	<i>Propilidium ancyloide ?</i>	„ <i>Islandicus</i>	
„ <i>nigra</i>	<i>Puncturella noachina</i>	<i>Trophon clathratum</i>	
<i>Nucula tenuis</i>	<i>Trochus (Margarita) cine-</i>	„ <i>harpularium</i>	
<i>Leda caudata</i>	<i>reus</i>	<i>Mangelia Trevilliana</i>	
	„ „ <i>undulatus</i>	„ <i>turricula</i>	
		„ <i>rufa</i>	

Being in proportion to the Scandinavian species—

<i>Acephala lamellibranchiata</i> .....	24	in 124, or 19 per cent.
<i>Acephala palliobranchiata</i> .....	2	„ 5, „ 40 „
<i>Pteropoda</i> .....	—	3, —
<i>Gasteropoda prosobranchiata</i> .....	32	„ 136, „ 24 „
<i>Gasteropoda opisthobranchiata</i> .....	—	21, —

Total of testaceous mollusca, common to Western Scandinavia and North America, 58 in 289, or 20 per cent. of the former.

The Scandinavian species found in the British seas are—

ACEPHALA LAMELLI- BRANCHIATA.			
<i>Teredo navalis</i>	<i>Xylophaga dorsalis</i>	<i>Saxicava arctica</i>	
„ <i>Norvegica</i>	<i>Pholas dactylus</i>	„ <i>rugosa</i>	
	„ <i>crispata</i>	<i>Mya arenaria</i>	
	„ <i>candida</i>	„ <i>truncata</i>	

*Panopæa Norvegica*  
*Corbula nucleus*  
     " *rosea*  
*Necora cuspidata*  
     " *costellata*  
     " *abbreviata*  
*Lyonsia Norvegica*  
*Thracia convexa*  
     " *phaseolina*  
     " *distorta*  
*Cochlodesma prætenue*  
*Solen ensis*  
     " *marginatus*  
     " *pellucidus*  
*Solecurtus coarctatus*  
*Psammobia vespertina*  
     " *ferroensis*  
     " *tellinella*  
*Tellina crassa*  
     " *pygmæa*  
     " *tenuis*  
     " *solidula*  
     " *proxima*  
*Syndosmya alba*  
     " *intermedia*  
     " *prismatica*  
*Scrobicularia piperata*  
*Donax anatinus?*  
*Mactra elliptica*  
     " *subtruncata*  
*Tapes virginea*  
     " *aurea*  
     " *pullastra*  
*Venus casina*  
     " *fasciata*  
     " *striatula*  
     " *ovata*  
*Artemis exoleta*  
     " *lineta*  
*Lucinopsis undata*  
*Cyprina Islandica*  
*Astarte sulcata*  
     " *elliptica*  
     " *compressa*  
     " *arctica*  
*Isocordia cor*  
*Cardium Norvegicum*  
     " *echinatum*  
     " *edule*

*Cardium fasciatum*  
     " *nodosum*  
     " *Suecicum*  
*Lucina borealis*  
     " *spinifera*  
     " *flexuosa*  
*Montacuta substriata*  
*Turtonia minuta*  
*Kellia suborbicularis*  
*Mytilus edulis*  
     " *Modiola modiolus*  
*Crenella decussata*  
     " *discors*  
     " *marmorata*  
     " *nigra*  
*Nucula nucleus*  
     " *nitida*  
     " *decussata*  
     " *tenuis*  
*Leda caudata*  
     " *pygmæa*  
*Arca tetragona*  
     " *raridentata*  
*Lima hians*  
     " *subauriculata*  
     " *Loscombii*  
*Pecten Varius*  
     " *pugio*  
     " *striatus*  
     " *tigrinus*  
     " *Danicus*  
     " *maximus*  
     " *opercularis*  
*Ostrea edulis*  
*Anomia ephippium*  
     " *aculeata*  
     " *patelliformis*  
     " *striata*  
  
 ACEPHALA PALLIO-  
 BRANCHIATA.  
*Hypothyris psittacea*  
*Terebratula caput ser-*  
     " *pentis*  
     " *cranium*  
*Crania anomala*  
  
 GASTEROPODA PROSO-  
 BRANCHIATA.  
*Chiton fascicularis*

*Chiton Hanleyi*  
     " *albus*  
     " *cinereus*  
     " *asellus*  
     " *marmoreus*  
     " *levis*  
     " *ruber*  
*Patella vulgata*  
     " *pellucida*  
*Acmæa testudinalis*  
     " *virginea*  
*Pilidium fulvum*  
*Propilidium ancyloide*  
*Dentalium entalis*  
*Pileopsis Ungaricus*  
*Puncturella noachina*  
*Emarginula crassa*  
     " *reticulata*  
*Trochus zizyphinus*  
     " *millegranus*  
     " *cinerarius*  
     " *tumidus*  
     " *alabastrum*  
     " *undulatus*  
     " *helicinus*  
*Scissurella crispata*  
*Littorina littorea*  
     " *rudis*  
     " *neritoides*  
     " *tenebrosa*  
     " *saxatilis*  
     " *littoralis*  
*Lacuna pallidula*  
     " *puteolus*  
     " *vineta*  
*Rissoa Zetlandica*  
     " *Beanii*  
     " *sculpta*  
     " *costata*  
     " *striata*  
     " *cingillus*  
     " *parva*  
     " *rufilabrum*  
     " *labiosa*  
     " *ulvæ*  
*Skenia planorbis*  
*Turritella communis*  
*Aporrhais pes pelicani*  
*Cerithium reticulatum*

<i>Cerithium adversum</i>	<i>Velutina lævigata</i>	<i>Mangelia costata</i>
" <i>metula</i>	" <i>flexilis</i>	" <i>attenuata</i>
<i>Scalaria Greenlandica</i>	<i>Lamellaria perspicua</i>	<i>Cypræa Europea</i>
" <i>Turtonis</i>	" <i>tentaculata</i>	<i>Ovula acuminata</i>
" <i>communis</i>	<i>Trichotropis borealis</i>	<i>Marginella lævis</i>
" <i>Trevilliana</i>	<i>Murex erinaceus</i>	
<i>Acia supranitida</i>	<i>Purpura lapillus</i>	GASTEROPODA OPISTHO-
<i>Stylifer Turtoni</i>	<i>Nassa reticulata</i>	BRANCHIATA.
<i>Eulima subulata</i>	" <i>incrassata</i>	<i>Cylichna cylindracea</i>
" <i>distorta</i>	<i>Buccinum undatum</i>	" <i>truncata</i>
" <i>polita (nitida)</i>	" <i>Humphreysianum</i>	" <i>nitidula</i>
<i>Chemnitzia rufa</i>	<i>Fusus Islandicus</i>	" <i>strigella</i>
<i>Odostomia Warreni</i>	" <i>antiquus</i>	" <i>umbilicata</i>
" <i>conoidea</i>	" <i>Norvegicus</i>	<i>Amphispira hyalina</i>
" <i>spiralis</i>	<i>Trophon clathratulus</i>	<i>Tomatella fasciata</i>
" <i>riisoides</i>	" <i>Barvicensis</i>	<i>Akera bullata</i>
" <i>eulimoides</i>	<i>Mangelia turricula</i>	<i>Bulla Cranchii</i>
<i>Eulimella Scille</i>	" <i>Trevilliana</i>	<i>Scaphander lignarius</i>
<i>Natica monilifera</i>	" <i>rufa</i>	<i>Philine aperta</i>
" <i>nitida</i>	" <i>nana</i>	" <i>quadrata</i>
" <i>pusilla</i>	" <i>teres</i>	" <i>scabra</i>
" <i>Montagui</i>	" <i>linearis</i>	" <i>pruinosa</i>
" <i>helicoides</i>	" <i>nebula</i>	<i>Aplysia hybrida</i>

Showing the proportion to Scandinavian species of—

<i>Acephala lamellibranchiata</i> .....	97	in 124, or 78 per cent.
<i>Acephala palliobranchiata</i> .....	4	" 5, " 80 "
<i>Pteropoda</i> .....	—	" 8 — "
<i>Gasteropoda prosobranchiata</i> .....	101	" 136, " 75 "
<i>Gasteropoda opisthobranchiata</i> .....	15	" 21, " 71 "

Total of testaceous mollusca, common to the west of Scandinavia and the British seas, 217 in 289, or 75 per cent. of the former.

The Scandinavian species found on the north coasts of Spain, including Vigo, are the following.—N.B. Some of them which I have not actually procured within the district, are included in consequence of their having been met with further south, and these are distinguished by the addition of their locality:—

ACEPHALA LAMELLI- BRANCHIATA.	<i>Necera costellata</i> , Cana- ries & Madeira	<i>Solen pellucidus</i> , Gibrat- ar
<i>Teredo navalis</i> , Canaries and Madeira	" <i>abbreviata</i> , Medi- terranean	<i>Solecuretus coarctatus</i> Ca- naries & Mediterranean
<i>Pholas candida</i> , Malaga	<i>Lyonsia Norvegica</i>	<i>Psammobia Ferroensis</i>
" <i>dactylus</i> do.	<i>Thracia convexa</i> , Gibrat- ar	Canaries and Mediterranean
<i>Saxicava arotica</i>	" <i>phaseolina</i>	" <i>vespertina</i>
" <i>rugosa</i>	<i>Solen ensis</i>	" <i>tellinella</i>
<i>Corbula nucleus</i>	" <i>marginatus</i>	<i>Tellina crassa</i>
<i>Necera cuspidata</i>		

*Tellina tenuis*  
 „ *solidula*, Medi-  
 terranean  
*Syndosmya alba*  
 „ *prismatica*  
*Serobicularia piperata*  
*Donax anatinus*  
*Mactra subtruncata*  
*Tapes aurea*  
 „ *virginea*  
 „ *pullastra*  
*Venus casina*, Gibraltar,  
 Canaries & Madeira  
 „ *striatula*  
 „ *fasciata*  
 „ *ovata*  
*Artemis exoleta*  
 „ *linct*  
*Lucinopsis undata*  
*Astarte sulcata*  
*Isocordia cor*, Medi-  
 terranean  
*Cardium fasciatum*, Medi-  
 terranean  
 „ *Norvegicum*  
 „ *edule*  
 „ *echinatum*  
*Lucina borealis*, Mogador  
 „ *spinifera*  
 „ *flexuosa*  
*Montacuta substriata*,  
 Mediterranean  
*Kellia suborbicularis*  
*Mytilus edulis*  
*Crenella marmorata*  
*Nucula nucleus*  
 „ *nitida*  
 „ *decussata*  
*Arca ridentata*, Gibraltar  
 „ *tetragona*  
*Lima Loesombii*, Gibralt-  
 ar  
 „ *subauriculata*, Can-  
 aries & Mediterranean  
 „ *hians*  
*Pecten maximus*  
 „ *opercularis*  
 „ *varius*  
 „ *tigrinus*

*Pecten pusio*  
 „ *striatus*  
*Ostrea edulis*  
*Anomia patelliformis*  
 „ *ephippium* (squa-  
 mulata)  
 „ *aculeata*  
 ACEPHALA PALLIOBRAN-  
 CHIATA.  
*Terebratula cap. serp.*,  
 Mediterranean  
*Anomia anomala*  
 GASTEROPODA PROBO-  
 BRANCHIATA.  
*Chiton fascicularis*  
*Chiton asellus*  
 „ *cinereus*  
 „ *lævis*  
*Patella vulgata*  
 „ *pellucida*  
*Acmœa virginea*  
*Dentalium entalis*?  
*Pileopsis Ungaricus*  
*Emarginula reticulata*,  
 Mediterranean  
*Trochus millegranus*, do.  
 „ *zizyphinus*  
 „ *tumidus*  
 „ *cinerarius*  
*Littorina littorea*  
 „ *rudis*  
 „ *littoralis*  
 „ *saxatilis*  
 „ *tenebrosa*  
 „ *neritoides*  
*Lacuna puteolus*  
*Rissoa sculpta*, Mediter-  
 ranean  
 „ *ulvæ*  
 „ *cingillus*  
 „ *costata*  
 „ *labiosa*  
 „ *parva*  
 „ *striata*  
*Turritella communis*  
*Aporrhais pes pelicani*

*Cerithium reticulatum*  
 „ *adversum*  
*Scalaria Turtonis*  
 „ *communis*  
*Eulima nitida*, Mediter-  
 ranean  
 „ *distorta*, Canaries  
 & Mediterranean  
 „ *subulata*  
*Chemnitzia rufa*  
*Odostomia conoidea*  
*Eulimella Scilloi*, Gibralt-  
 ar and Canaries  
*Natica nitida*  
 „ *monilifera*?  
*Velutina lævigata*  
*Lamellaria perspicua*  
*Murex erinaceus*  
*Purpura lapillus*  
*Nassa reticulata*  
 „ *incrassata*  
*Mangelia attenuata*  
 „ *costata*  
 „ *nebula*  
 „ *linearis*  
 „ *teres*, Mediter-  
 ranean, Canaries, and  
 Madeira  
*Cypræa Europæa*  
*Ovula acuminata*, Medi-  
 terranean  
 GASTEROPODA OPISTHO-  
 BRANCHIATA.  
*Cylichna strigella*  
 „ *cylindracea*  
 „ *umbilicata*  
 „ *truncata*  
*Amphispira hyalina*, Can-  
 aries & Mediterranean  
*Tornatella fasciata*  
*Akera bullata*  
*Bulla Cranchii*, Canaries  
 and Mediterranean  
*Scaphander lignarius*  
*Philine aperta*  
 „ *scabra*  
*Aplysia hybrida*? Canaries

Being—

<i>Acephala lamellibranchiata</i> .....	68 in 124, or 55 per cent.
<i>Acephala palliobranchiata</i> .....	2 „ 5, „ 40 „
<i>Pteropoda</i> .....	— „ 3, —
<i>Gasteropoda prosobranchiata</i> .....	55 „ 136, „ 40 „
<i>Gasteropoda opisthobranchiata</i> .....	12 „ 21, „ 57 „

Total of Testaceous Mollusca, common to the west of Scandinavia and the north of Spain, 137 in 289, or 47 per cent. of the former.

All the species, enumerated in the list immediately preceding, inhabit the Mediterranean, or to the southward of Cape St. Vincent, except the following :—

ACEPHALA LAMELLI- BRANCHIATA.	GASTEROPODA PROSO- BRANCHIATA.	<i>Littorina tenebrosa</i> <i>Rissoa Ulvæ</i> „ <i>striatula</i> „ <i>vitrea</i> <i>Lacuna puteolus</i> <i>Natica monilifera</i> <i>Velutina lævigata</i> <i>Purpura lapillus</i>
<i>Donax anatinus</i> ?	<i>Chiton cinereus</i>	
<i>Pecten tigrinus</i> ?	„ <i>assellus</i>	
	<i>Trochus tumidus</i>	
	„ <i>cinerarius</i>	
ACEPHALA PALLIO- BRANCHIATA.	<i>Littorina rudis</i>	
	„ <i>littoralis</i>	
<i>Crania anomala</i>	„ <i>saxatilis</i>	

Consequently, there are of Scandinavian species extending into the Mediterranean region—

<i>Acephala lamellibranchiata</i> .....	66 in 124, or 53 per cent.
<i>Acephala palliobranchiata</i> .....	1 „ 3, „ 20 „
<i>Pteropoda</i> .....	— „ 3, —
<i>Gasteropoda prosobranchiata</i> .....	40 „ 136, „ 30 „
<i>Gasteropoda opisthobranchiata</i> .....	12 „ 21, „ 57 „

Total of testaceous mollusca, common to the west of Scandinavia and the Mediterranean region, 119 in 289, or 41 per cent.

The Scandinavian species obtained in the Canary Islands are—

ACEPHALA LAMELLI- BRANCHIATA.	<i>Cardium fasciatum</i> „ <i>Norvegicum</i> „ <i>edule</i> . <i>Lucina flexuosa</i> „ <i>spinifera</i> <i>Kellia suborbicularis</i> <i>Crenella marmorata</i> <i>Arca tetragona</i> <i>Lima hians</i> „ <i>suborbicularis</i> <i>Pecten opercularis</i> „ <i>pusio</i>	<i>Emarginula reticulata</i> <i>Trochus zizyphinus</i> <i>Littorina neritoides</i> <i>Rissoa parva</i> „ <i>costata</i> „ <i>textilis</i> ? <i>Cerithrum adversum</i> „ <i>reticulatum</i> <i>Eulima nitida</i> <i>Eulima distorta</i> <i>Chemnitzia rufa</i> <i>Odostomia conoidea</i> <i>Eulimella Scillæ</i> <i>Nassa reticulata</i>
<i>Teredo navalis</i>		
<i>Saxicava arctica</i>		
<i>Corbula nucleus</i>		
<i>Necora cuspidata</i>		
„ <i>costellata</i>		
<i>Thracia phaseolina</i>		
<i>Solecurtus coarctatus</i>		
<i>Psammobia vespertina</i>		
„ <i>ferroensis</i>		
<i>Donax anatinus</i>		
<i>Mactra subtruncata</i> ?		
<i>Venus casina</i>		
<i>Cardium echinatum</i>	GASTEROPODA PROSO- BRANCHIATA. <i>Chiton fascicularis</i>	

<i>Nassa incrassata</i>	GASTEROPODA OPISTHO-	<i>Bulla Cranchii</i>
<i>Mangelia linearis</i>	BRANCHIATA.	<i>Philine aperta</i>
„ <i>nebula</i>	<i>Cylichna cylindracea</i>	<i>Aplysia punctata</i> or
„ <i>teres</i>	„ <i>truncata</i>	<i>hybrida</i>
	<i>Amphispira hyalina</i>	

Being—

<i>Acephala lamellibranchiata</i> .....	25 in 124, or 20 per cent.
<i>Acephala palliobranchiata</i> .....	— „ 5, „ — „
<i>Pteropoda</i> .....	— „ 3, „ — „
<i>Gasteropoda prosobranchiata</i> .....	10 „ 136, „ 14 „
<i>Gasteropoda opisthobranchiata</i> .....	6 „ 21, „ 29 „

Total number of marine testaceous mollusca common to the west of Scandinavia and to the Canary Islands, 50 in 289, or 17 per cent. of the former.

#### BRITISH SEAS.

The number of species of British marine testaceous mollusca, recorded by Messrs. Forbes and Hanley, is 406.

<i>Acephala lamellibranchiata</i> .....	163
<i>Acephala palliobranchiata</i> .....	5
<i>Pteropoda</i> .....	4
<i>Gasteropoda prosobranchiata</i> .....	209
<i>Gasteropoda opisthobranchiata</i> .....	25

The following British species are common to North America :—

ACEPHALA LAMELLI- BRANCHIATA.	<i>Leda pygmaea</i>	<i>Lacuna vineta</i>
<i>Teredo Norvegicus</i>	<i>Anomia aculeata</i>	<i>Lacuna puteolus</i>
<i>Pholas crispata</i>	ACEPHALA PALLIO- BRANCHIATA.	<i>Skenia divisa</i> (serpu- loides)
<i>Saxicava arctica</i>	<i>Hypothyris psittacea</i>	„ <i>planorbis</i>
„ <i>rugosa</i>	<i>Terebratula caput ser- pentis</i>	<i>Skenia?</i> ( <i>margarita?</i> ) <i>costulata</i>
<i>Mya truncata</i>	GASTEROPODA PROSO- BRANCHIATA.	<i>Scalaria Groenlandica</i>
„ <i>arenaria</i>	<i>Chiton albus</i>	<i>Natica pusilla</i>
<i>Panopaea Norvegica</i>	„ <i>assellus</i>	„ <i>helicoides</i>
<i>Solen ensis</i>	„ <i>cinereus</i>	<i>Velutina laevigata</i>
<i>Tellina proxima</i>	„ <i>marmoreus</i>	<i>Lamellaria perspicua</i>
<i>Cyprina Islandica</i>	„ <i>ruber</i>	<i>Trichotropis borealis</i>
<i>Astarte sulcata</i>	<i>Acmœa testudinalis</i>	<i>Purpura lapillus</i>
<i>Lucina borealis</i>	<i>Propilidium ancyloide?</i>	<i>Buccinum undatum</i>
„ <i>flexuosa</i>	<i>Puncturella noachina</i>	„ <i>Dalei</i>
<i>Turtonia minuta</i>	<i>Trochus helacinus</i>	<i>Fusus Islandicus</i>
<i>Kellia rubra</i>	„ <i>undulatus</i>	„ <i>antiquus</i>
<i>Mytilus edulis</i>	<i>Janthina communis</i>	„ <i>propinquus</i>
<i>Modiola modiolus</i>	<i>Littorina rudis</i>	<i>Trophon clathratus</i>
<i>Crenella discors</i>	„ <i>tenebrosa</i>	„ <i>muricatus</i>
„ <i>nigra</i>		<i>Mangelia turricula</i>
„ <i>decussata</i>		„ <i>rufa</i>
<i>Nucula tenuis</i>		„ <i>Trevilliana</i>
<i>Leda caudata</i>		

Shewing the proportion to British species of—

<i>Acephala lamellibranchiata</i> .....	24	in 163, or 14 per cent.
<i>Acephala palliobranchiata</i> .....	2	„ 5, „ 40 „
<i>Pteropoda</i> .....	—	4, — „
<i>Gasteropoda prosobranchiata</i> .....	35	„ 209, „ 17 „
<i>Gasteropoda opisthobranchiata</i> .....	—	25, „ — „

Total of British marine testaceous mollusca, common to North America, 61 in 406, or 15 per cent.

Referring to the list of species common to Britain and Scandinavia, we find them to bear the following proportion to the British species :—

<i>Acephala lamellibranchiata</i> .....	97	in 163, or 61 per cent.
<i>Acephala palliobranchiata</i> .....	4	„ 5, „ 80 „
<i>Pteropoda</i> .....	—	4, — „
<i>Gasteropoda prosobranchiata</i> .....	101	„ 209, „ 49 „
<i>Gasteropoda opisthobranchiata</i> .....	15	„ 25, „ 60 „

Total of British marine testaceous mollusca, common to Scandinavia, 217 in 406, or 53 per cent.

The following British species have been obtained on the coasts of the north of Spain, including Vigo, except those marked,\* which, though not hitherto procured from the district, may be considered as belonging to it, in consequence of having been found in more southern localities :—

ACEPHALA LAMELLI- BRANCHIATA.	Lyonsia Norvegica	<i>Tellina tenuis</i>
<i>Teredo navalis</i> *	<i>Thracia phaseolina</i> *	„ <i>fabula</i> *
„ <i>palmulata</i> *	„ <i>pubescens</i> *	„ <i>solidula</i> *
<i>Pholas candida</i> *	„ <i>convexa</i> *	<i>Syndosmya alba</i>
„ <i>dactylus</i> *	<i>Solen marginatus</i>	„ <i>prismatica</i>
„ <i>parva</i> *	„ <i>ensis</i>	„ <i>tenuis</i>
<i>Gastrochoena modiolina</i> *	„ <i>siliqua</i>	<i>Scrobicularia piperata</i>
<i>Saxicava arctica</i>	„ <i>pellucidus</i> *	<i>Donax anatinus</i>
„ <i>rugosa</i>	<i>Ceratisolen legumen</i> *	„ <i>politus</i> *
<i>Petricola lithophaga</i>	<i>Solecurtus coarctatus</i> *	<i>Ervilia castanea</i> *
<i>Venerupis irus</i>	„ <i>candidus</i> *	<i>Mactra subtruncata</i>
<i>Corbula nucleus</i>	<i>Psammobia vespertina</i>	„ <i>solida</i>
<i>Sphæria Binghami</i> *	„ <i>tellinella</i>	„ <i>stultoum</i> *
<i>Necera cuspidata</i>	„ <i>Ferroensis</i> *	„ <i>helvacea</i> *
„ <i>costellata</i> *	„ <i>costulata</i>	<i>Lutraria elliptica</i>
„ <i>abbreviata</i> *	<i>Diodonta fragilis</i>	„ <i>oblonga</i>
<i>Poromya granulata</i> *	<i>Tellina crassa</i>	<i>Tapes decussata</i>
<i>Pandora rostrata</i>	„ <i>balaustina</i> *	„ <i>virginea</i>
„ <i>obtusa</i>	„ <i>incarnata</i> *	„ <i>pullastra</i>
	„ <i>donacina</i>	„ <i>aurea</i>



<i>Cytheria chione</i> *	<i>Pinna pectinata</i> *	<i>Trochus tumidus</i>
<i>Venus verrucosa</i>	<i>Lima subauriculata</i> *	„ <i>cinerarius</i>
„ <i>striatula</i>	„ <i>Loscombii</i> *	„ <i>umbilicatus</i>
„ <i>casina</i> *	„ <i>hians</i>	„ <i>magus</i>
„ <i>fasciata</i>	<i>Pecten varius</i>	„ <i>lineatus</i>
„ <i>ovata</i>	„ <i>pusio</i>	<i>Phasianella pullus</i>
<i>Artemis exoleta</i>	„ <i>striatus</i>	<i>Adeorbis subcarinata</i>
„ <i>linctata</i>	„ <i>tigrinus</i>	<i>Janthina pallida</i> *
<i>Lucinopsis undata</i>	„ <i>similis</i>	„ <i>exigua</i> *
<i>Circe minima</i>	„ <i>opercularis</i>	„ <i>communis</i>
<i>Astarte sulcata</i>	„ <i>maximus</i>	<i>Littorina neritoides</i>
„ <i>triangularis</i>	<i>Ostrea edulis</i>	„ <i>littorea</i>
<i>Isocardia cor</i> *	<i>Anomia ephippium</i>	„ <i>rudis</i>
<i>Cardium aculeatum</i> *	„ <i>patelliformis</i>	„ <i>littoralis</i>
„ <i>rusticum</i>	„ <i>aculeata</i> *	„ <i>saxatilis</i>
„ <i>echinatum</i>	<i>ACEPHALA PALIOL.</i>	<i>Lacuna puteolus</i> ?
„ <i>edule</i>	<i>BRANCHIATA.</i>	<i>Rissoa striatula</i> *
„ <i>fasciatum</i>	<i>Terebratula caput ser-</i>	„ <i>lactea</i>
„ <i>pygmaeum</i>	<i>pentis</i> *	„ <i>crenulata</i>
„ <i>Norvegicum</i>	<i>Crania anomala</i>	„ <i>calathus</i>
<i>Lucina borealis</i> *	<i>PTEROPODA.</i>	„ <i>sculpta</i>
„ <i>spinifera</i>	<i>Hyalaea trispinosa</i> *	„ <i>costata</i> *
„ <i>divaricata</i> *	<i>GASTEROPODA PROSO-</i>	„ <i>striata</i>
„ <i>flexuosa</i>	<i>BRANCHIATA.</i>	„ <i>parva</i>
„ <i>leucoma</i>	<i>Chiton fascicularis</i>	„ <i>costulata</i>
„ <i>ferruginosa</i> *	„ <i>discrepans</i>	„ <i>labiosa</i>
<i>Diplodonta rotundata</i> *	„ <i>cinereus</i>	„ <i>semistriata</i> *
<i>Montacuta bidentata</i>	„ <i>asellus</i>	„ <i>rubra</i> *
„ <i>ferruginosa</i> *	„ <i>cancellatus</i>	„ <i>cingillus</i>
„ <i>substriata</i> *	„ <i>laevis</i>	„ <i>vitrea</i>
<i>Kellia suborbicularis</i>	<i>Patella vulgata</i>	„ <i>ulvae</i>
„ <i>rubra</i>	„ <i>pellucida</i>	<i>Jeffreysia opalina</i>
<i>Lepton squamosum</i>	<i>Acmæa virginea</i>	<i>Skenia nitidissima</i>
<i>Galeomma Turtoni</i>	<i>Dentalium Tarentinum</i>	„ <i>laevis</i> *
<i>Mytilus edulis</i>	<i>Pileopsis Ungaricus</i>	<i>Turritella communis</i>
<i>Modiola tulipa</i>	<i>Calyptroea reticulata</i>	<i>Cœcum trachea</i>
„ <i>barbata</i> *	<i>Fissurella Sinensis</i>	<i>Aporrhais pes pellicani</i>
<i>Crenella marmorata</i>	<i>Emarginula reticulata</i> *	<i>Cerithium reticulatum</i>
„ <i>costulata</i>	„ <i>rosea</i>	„ <i>adversum</i>
„ <i>rhombea</i> *	<i>Haliotis tuberculata</i>	<i>Scalaria communis</i>
<i>Nucula nucleus</i>	<i>Trochus zizyphinus</i>	„ <i>Turtonis</i>
„ <i>nitida</i>	„ <i>granulatus</i>	„ <i>Clathratula</i>
„ <i>radiata</i>	„ <i>millegranus</i>	<i>Acilis ascaris</i>
„ <i>decussata</i> *	„ <i>exiguus</i>	<i>Eulima polita</i>
<i>Arca tetragona</i>	„ <i>striatus</i>	„ <i>distorta</i>
„ <i>lactea</i>	„ <i>Montagui</i>	„ <i>subulata</i>
„ <i>aridentata</i> *		<i>Chemnitzia elegantissima</i>
<i>Pectunculus Glycimeris</i>		„ <i>rufa</i>
<i>Auricula Tarentina</i>		„ <i>fenestrata</i>

<i>Chemnitzia scalaris</i>	<i>Nassa reticulata</i>	GASTEROPODA OPIS-
" <i>indistincta</i> ?	" <i>incrassata</i>	THOBRANCHIATA.
<i>Odostomia conoidea</i>	" <i>pygmaea</i>	<i>Cylichna cylindracea</i>
" <i>acuta</i> *	<i>Trophon muricatus</i>	" <i>truncata</i>
" <i>spiralis</i> *	<i>Mangelia septangularis</i>	" <i>mamillata</i>
<i>Eulimella acicula</i> *	" <i>teres</i>	" <i>umbilicata</i>
" <i>Scillœ</i> *	" <i>Lefroyi</i>	" <i>strigella</i> *
<i>Truncatella Montaguï</i> *	<i>Mangelia linearis</i>	<i>Tornatella fasciata</i>
<i>Natica monilifera</i> ?	" <i>gracilis</i>	<i>Akera bullata</i>
" <i>nitida</i>	" <i>brachystoma</i>	<i>Bulla hydatidis</i>
" <i>sordida</i> *	" <i>purpurea</i>	" <i>Cranchii</i> *
<i>Velutina lævigata</i>	" <i>attenuata</i>	<i>Scaphander lignarius</i>
<i>Lammellaria perspicua</i>	" <i>costata</i>	<i>Philine aperta</i>
<i>Cerithiopsis tubercularis</i> *	" <i>striolata</i>	" <i>scabra</i>
<i>Murex erinaceus</i>	" <i>nebula</i>	" <i>catena</i> *
" <i>corrallinus</i>	<i>Cyprœa Europea</i>	<i>Aplysia hybrida</i> *
<i>Lachesis minima</i>	<i>Ovula acuminata</i>	
<i>Purpura lapillus</i>	<i>Marginella lævis</i>	

Shewing in proportion with the British species—

<i>Acephala lamellibranchiata</i> .....	122 in 163, or 75 per cent.
<i>Acephala palliobranchiata</i> .....	2 " 5, " 40 "
<i>Pteropoda</i> .....	1 " 4, " 25 "
<i>Gasteropoda prosobranchiata</i> ...	107 " 209, " 51 "
<i>Gasteropoda opisthobranchiata</i> ...	14 " 25, " 56 "

Total of British marine testaceous mollusca, common to the North of Spain, 246 in 406, or 61 per cent.

All the species common to Britain and the North of Spain, are likewise met with in the South Peninsula or Mediterranean except nineteen, viz., *mactra solida*, and those already enumerated as Scandinavian species, found in the North of Spain, but not to the southward of Cape St. Vincent. Consequently the South Peninsular and Mediterranean species, compared with the British are—

<i>Acephala lamellibranchiata</i> .....	119 in 163, or 71 per cent.
<i>Acephala palliobranchiata</i> .....	1 " 5, " 20 "
<i>Pteropoda</i> .....	1 in 4, or 25 per cent.
<i>Gasteropoda prosobranchiata</i> ...	92 " 209, " 42 "
<i>Gasteropoda opisthobranchiata</i> ...	14 " 25, " 56 "

Total of British marine testaceous mollusca, common to the South of Cape St. Vincent and the Mediterranean, 227 in 406, or 56 per cent. The following British species have been obtained in the Canary Islands.

ACEPHALA LAMELLI-	<i>Venerupis irus</i>	<i>Pandora rostrata</i> ?
BRANCHIATA.	<i>Corbula nucleus</i>	" <i>obtusa</i>
<i>Teredo navalis</i> ?	<i>Necora costellata</i>	<i>Thracia phaseolina</i>
<i>Saxicava artica</i>	" <i>cuspidata</i>	" <i>pubescens</i>

<i>Solecortus candidus</i>	<i>Arca lactea</i>	<i>Cerithium adversum</i>
„ <i>coarctatus</i>	„ <i>tetragona</i>	<i>Scalaria clathratula</i>
<i>Psammobia vespertina</i>	<i>Pectunculus Glycimeris</i>	<i>Eulima distorta</i>
„ <i>costulata</i>	<i>Avicula Tarentina</i>	„ <i>polita (nitida)</i>
„ <i>Ferroensis</i>	<i>Lima hians</i>	<i>Chemnitzia rufa</i>
<i>Tellina incarnata</i>	„ <i>subauriculata</i>	„ <i>elegantissima</i>
„ <i>balaustina</i>	<i>Pecten opercularis</i>	„ <i>indistincta?</i>
<i>Donax anatinus?</i>	„ <i>pusio</i>	<i>Odostomia conoidea</i>
<i>Ervilia castanea</i>	PTEROPODA.	<i>Eulimella Scillo</i>
<i>Mactra subtruncata?</i>	<i>Hyalæa trispinosa?</i>	<i>Truncatella Montagui</i>
„ <i>stultorum</i>	GASTEROPODA PROSO-	<i>Lemellaria perspicua</i>
<i>Cytheria chione</i>	BRANCHIATA.	<i>Cerithiopsis tubercularis</i>
<i>Venus verrucosa</i>	<i>Chiton fascicularis</i>	<i>Murex corallinus</i>
„ <i>casina</i>	<i>Calyptræa Sinensis</i>	<i>Nassa reticulata</i>
<i>Circe minima</i>	<i>Fissurella reticulata</i>	„ <i>incrassata</i>
<i>Astarte triangularis</i>	<i>Emarginula reticulata</i>	<i>Mangelia purpurea</i>
<i>Cardium echinatum</i>	<i>Haliotis tuberculata</i>	„ <i>Lefroyi</i>
„ <i>rusticum</i>	<i>Trochus zizyphinus</i>	„ <i>striolata</i>
„ <i>edule</i>	„ <i>striatus</i>	„ <i>linearis</i>
„ <i>fasciatum</i>	„ <i>magus</i>	„ <i>nebula</i>
„ <i>Norvegicum</i>	„ <i>granulatus</i>	„ <i>gracilis</i>
<i>Lucina leucoma</i>	„ <i>exiguus</i>	„ <i>teres</i>
„ <i>flexuosa</i>	<i>Phasianella pullus</i>	GASTEROPODA OPISTHO-
<i>Lucina divaricata</i>	<i>Janthina communis</i>	BRANCHIATA
„ <i>spinifera</i>	„ <i>exigua</i>	<i>Cylichna cylindracea</i>
<i>Diplodonta rotundata</i>	<i>Littorina neritea</i>	„ <i>truncata</i>
<i>Kellia rubra</i>	<i>Rissoa costata</i>	„ <i>mamillata</i>
„ <i>suborbicularis</i>	„ <i>parva</i>	<i>Bulla hydatis</i>
<i>Modiola tulipa</i>	„ <i>textilis?</i>	„ <i>Cranchii</i>
<i>Crenella rhombea</i>	<i>Coecum trachea</i>	<i>Aplysia hybrida</i>
„ <i>marmorata</i>	<i>Cerithium reticulatum</i>	

Shewing, on comparison with the list of British species—

<i>Acephala lamellibranchiata</i> .....	49 in 163, or 30 per cent.
<i>Acephala palliobranchiata</i> .....	— „ 5, „ — „
<i>Pteropoda</i> .....	1 „ 4, „ 25 „
<i>Gasteropoda prosobranchiata</i> ...	41 „ 209, „ 18 „
<i>Gasteropoda opisthobranchiata</i>	6 „ 25, „ 24 „

Total of British species, common to the Canaries 97 in 406, or 24 per cent.

#### NORTH COASTS OF SPAIN.

I am not acquainted with any catalogue of the mollusca of the district under consideration, and accordingly in treating of their distribution, I must refer to the following list of what I have myself collected on the coasts of the Asturias and Galicia—a large proportion of them being from Vigo Bay.

**ACEPHALA LAMELLI-**  
**BRANCHIATA.**  
*Gastrochena modiolina*,  
 or *cuneiformis*  
*Saxicava arctica*  
 „ *rugosa*  
*Petricola lithophaga*  
*Venerupis irus*  
*Corbula nucleus*  
*Necera cuspidata*  
*Pandora rostrata*  
 „ *obtusa*  
*Lyonsia Norvegica*  
*Thracia phaseolina*  
*Solen marginatus*  
 „ *ensis*  
 „ *siliqua*  
*Psammobia tellinella*  
 „ *vespertina*  
*Diodonta fragilis*  
*Tellina crassa*  
 „ *donacina*  
 „ *distorta?*  
 „ *tenuis*  
 „ *serrata*  
*Syndosmya alba*  
 „ *prismatica*  
 „ *tenuis*  
*Scrobicularia piperata*  
*Donax anatinus*  
*Mesodesma donacilla*  
*Mactra subtruncata*  
 „ *solida*  
*Lutraria elliptica*  
 „ *oblonga*  
 „ *rugosa*  
*Tapes virginea*  
 „ *decussata*  
 „ *pulastra*  
 „ *aurea*  
*Venus verrucosa*  
 „ *striatula*  
 „ *fasciata*  
 „ *ovata*  
*Artemis exoleta*  
 „ *lincta*  
*Lucinopsis produta*  
*Circe minima*  
*Astarte sulcata*

*Astarte triangularis*  
*Cardium edule*  
 „ *echinatum*  
 „ *rusticum*  
 „ *ciliare*  
 „ *Norvegicum*  
 „ *papillosum?*  
 „ *pygmæum*  
*Lucina leucoma*  
 „ *digitalis*  
 „ *flexuosa*  
 „ *spinifera*  
 „ *pecten*  
*Montacuta bidentata*  
*Kellia suborbicularis*  
*Kellia?* (genus uncertain)  
*Lepton squamosum*  
*Galeomma Turtoni*  
*Mytilus Galloprovincialis*  
 „ *edulis*  
*Modiola tulipa*  
*Lithodomus caudigerus*  
*Crenella marmorata*  
 „ *costulata*  
*Nucula nucleus*  
 „ *nitida*  
 „ *radiata*  
*Arca tetragona*  
 „ *lactea*  
*Pectunculus glycimeris*  
*Avicula Tarentina*  
*Lima hians*  
*Pecten maximus*  
 „ *opercularis*  
 „ *varius*  
 „ *pusio*  
 „ *striatus*  
 „ *tigrinus*  
 „ *similis*  
*Ostrea edulis*  
*Anomia ephippium*  
 „ *patelliformis*  
  
**ACEPHALA PALLIOBRAN-**  
**CHIATA.**  
*Crania anomala*  
  
**GASTEROPODA PROSO-**  
**BRANCHIATA.**  
*Chiton rufus*

*Chiton fascicularis*  
 „ *cinereus*  
 „ *asellus*  
 „ *lœvis*  
 „ *cancellatus*  
 „ *cajetanus*  
*Patella vulgata*  
 „ *pellucida*  
*Acmaea virginea*  
*Dentalium Tarentinum*  
 „ *Dentalis*  
 „ *new spec.*  
*Pileopsis Ungaricus*  
*Calyptrea Sinensis*  
*Fissurella reticulata*  
 „ *gibba*  
*Emarginula rosea*  
*Haliotis tuberculata*  
*Trochus zizyphinus*  
 „ *umbilicatus*  
 „ *tumidus*  
 „ *striatus*  
 „ *exiguus*  
 „ *Montagui*  
 „ *magus*  
 „ *Laugierii*  
 „ *cinerarius*  
 „ *lineatus*  
 „ —  
 „ —  
 „ —  
*Phasianella pullus*  
*Solarium luteum*  
 „ *stramineum*  
*Adeorbis subcarinatus*  
*Turbo rugosus*  
*Janthina communis?*  
*Littorina neritoides*  
 „ *littorea*  
 „ *rudis*  
 „ *littoralis*  
 „ *tenebrosa*  
 „ *tigrina* (Dorb.)  
 „ *saxatilis*  
*Lacuna puteolus*  
*Rissoa ulva*  
 „ *cingillus*  
 „ *costata*  
 „ *costulata*

<i>Rissoa labiosa</i>	<i>Chemnitzia fenestrata</i>	<i>Triton corrugatum</i>
„ <i>striata</i>	„ <i>indistincta</i>	<i>Mangelia attenuata</i>
„ <i>vitrea</i>	„ —	„ <i>costata</i>
„ <i>parva</i>	<i>Odostomia conoidea</i>	„ <i>linearis</i>
„ <i>calathus</i>	„ —	„ <i>brachystoma</i>
„ <i>crenulata</i>	<i>Natica nitida</i>	„ <i>purpurea</i>
„ <i>lactea</i>	„ <i>monilifera</i>	„ <i>septangularis</i>
„ <i>purpurea</i>	<i>Velutina lævigata</i>	„ <i>striolata</i>
<i>Jeffreysia opalina</i> ?	<i>Lamellaria perspicua</i>	<i>Pleurotoma elegans</i>
<i>Skenia nitidissima</i> ?	<i>Murex erinaceus</i>	<i>Cypræa Europea</i>
<i>Turritella tricostralis</i>	„ <i>corallinus</i>	<i>Marginella lævis</i>
„ <i>communis</i>	„ <i>Edwardsii</i>	<i>Ringuicula auriculata</i>
<i>Cœcum trachea</i>	„ —	
<i>Aporrhais pes pelicani</i>	<i>Lachesis minima</i>	GASTEROPODA OPISTHO-
<i>Cerithium reticulatum</i>	<i>Purpura lapillus</i>	BRANCHIATA.
„ <i>adversum</i>	„ <i>hæmastoma</i>	<i>Cylichna cylindracea</i>
<i>Scalaria communis</i>	<i>Nassa reticulata</i>	„ <i>mamillata</i>
„ <i>Turtonis</i>	„ <i>incrassata</i>	„ <i>truncata</i>
„ <i>clathraluta</i>	„ <i>pygmæa</i>	<i>Tornatella fasciata</i>
<i>Adis ascaris</i>	„ <i>trifasciata</i>	<i>Akera bullata</i>
<i>Eulima polita</i>	<i>Buccinum corniculum</i>	<i>Bulla hydatis</i>
„ <i>subulata</i>	<i>Cassis saburon</i> ?	<i>Scaphander lignarius</i>
<i>Chemnitzia elegantis-</i>	<i>Fusus contrarius</i>	<i>Philine aperta</i>
„ <i>sima</i>	„ —	„ <i>scabra</i>
„ <i>scalaris</i>	<i>Trophon muricatus</i>	<i>Aplysia Patersoni</i>
„ <i>rufa</i>	<i>Triton nodiferum</i>	

Being of—

<i>Acephala lamellibranchiata</i> .....	88	} 212 Species.
<i>Acephala palliobranchiata</i> ... ..	1	
<i>Gasteropoda prosobranchiata</i> .....	13	
<i>Gasteropoda opisthobranchiata</i> ... ..	10	

The following species appear to be common to the North of Spain and to North America :—

ACEPHALA LAMELLI-	<i>Lucina flexuosa</i>	<i>Littorina rudis</i>
BRANCHIATA.	<i>Mytilus edulis</i>	<i>Iacuna puteolus</i>
<i>Teredo navalis</i> ?		<i>Velutina lævigata</i>
<i>Saxicava arctica</i>	GASTEROPODA PROSO-	<i>Lamellaria perspicua</i>
„ <i>rugosa</i>	BRANCHIATA.	<i>Purpura lapillus</i>
<i>Solen ensis</i>	<i>Chiton cinereus</i>	<i>Trophon muricatus</i>
<i>Astarte sulcata</i>	<i>Janthina communis</i> ?	

Shewing the proportion of North Spanish species recorded from North America to be—

<i>Acephala lamellibranchiata</i> .....	7 in 88, or 8 per cent.
<i>Acephala palliobranchiata</i> .....	— „ 1, „ — „
<i>Gasteropoda prosobranchiata</i> .....	8 „ 113, „ 7 „
<i>Gasteropoda opisthobranchiata</i> ... ..	— „ 10. „ — „

Total 15 in 212, or 7 per cent.

Referring to the list already given of species common to Scandinavia and the North of Spain, and deducting from it those species which are included upon the strength of their having been found further South, the proportion of North Spanish species common to Scandinavia will be found to be—

<i>Acephala lamellibranchiata</i> .....	49 in 88, or 56 per cent.
<i>Acephala palliobranchiata</i> .....	1 „ 1, „ 100 „
<i>Gasteropoda prosobranchiata</i> ...	48 „ 113, „ 42 „
<i>Gasteropoda opisthobranchiata</i> ...	8 „ 10, „ 80 „

Total 106 in 212, or 50 per cent.

On comparing the North of Spain list with species recorded from the South of Spain and Mediterranean, there appears to be absent from the latter district—

<b>ACEPHALA LAMELLI- BRANCHIATA.</b>	<i>Chiton asellus</i>	<i>Jeffreysia opalina</i> ?
<i>Kellia</i> ? genus doubtful	„ <i>cancellatus</i>	<i>Lacuna puteolus</i>
<i>Donax anatinus</i> ?	<i>Dentalium</i> , new spec.	<i>Natica monilifera</i>
<i>Mactra solida</i>	<i>Trochus tumidus</i>	<i>Velutina lævigata</i>
<i>Tapes pultastra</i>	„ <i>cinerarius</i> ?	<i>Murex</i> —
<i>Pecten tigrinus</i> ?	<i>Littorina rudis</i>	<i>Purpura lapillus</i>
	„ <i>littoreus</i>	<i>Fusus contrarius</i>
	„ <i>saxatilis</i>	„ —
<b>GASTEROPODA PROSO- BRANCHIATA.</b>	„ <i>tenebrosa</i>	
<i>Chiton rufus</i>	<i>Rissoa ulvæ</i>	<b>GASTEROPODA OPISTHO- BRANCHIATA.</b>
„ <i>cinereus</i>	„ <i>striata</i>	<i>Aplysia Patersoni</i>
	„ <i>vitrea</i>	

Leaving of Gallician and Asturian species known to inhabit South of Cape St. Vincent—

<i>Acephala lamellibranchiata</i> .....	83 in 88, or 94 per cent.
<i>Acephala palliobranchiata</i> .....	— „ 1, „ — „
<i>Gasteropoda prosobranchiata</i> .....	91 „ 113, „ 80 „
<i>Gasteropoda opisthobranchiata</i> ..	9 „ 10, „ 90 „

Total 183 in 212, or 86 per cent.

The following species of the North of Spain have been obtained in the Canary Islands :—

<b>ACEPHALA LAMELLI- BRANCHIATA.</b>	<i>Thracia phaseolina</i>	<i>Cardium edule</i>
<i>Gastrochœa cuneiformis</i> ?	<i>Psammobia vespertina</i>	„ <i>echinatum</i>
<i>Saxicava arctica</i>	<i>Tellina distorta</i>	„ <i>rusticum</i>
<i>Venerupis irus</i>	„ <i>serrata</i>	„ <i>papillosum</i>
<i>Corbula nucleus</i>	<i>Donax anatinus</i>	„ <i>norvegicum</i>
<i>Neœra cuspidata</i>	<i>Mactra subtruncata</i>	<i>Lucina leucoma</i>
<i>Pandora rostrata</i> ?	<i>Lutraria rugosa</i>	„ <i>flexuosa</i>
„ <i>obtusa</i>	<i>Venus verrucosa</i>	„ <i>spinifera</i>
	<i>Circe minima</i>	„ <i>pecten</i>
	<i>Astarte triangularis</i>	<i>Kellia suborbicularis</i>

<i>Modiola tulipa</i>	<i>Trochus magus</i>	<i>Chemnitzia indistincta</i> ?
<i>Crenella marmorata</i>	" <i>zizyphinus</i>	<i>Odostomia conoidea</i>
<i>Arca tetragona</i>	<i>Solarium luteum</i>	<i>Murex corallinus</i>
" <i>lactea</i>	<i>Turbo rugosus</i>	" <i>Edwardsii</i>
<i>Pectunculus glycymeris</i>	<i>Phasianella pullus</i>	<i>Purpura hæmastoma</i>
<i>Auricula Tarentina</i>	<i>Janthina communis</i>	<i>Nassa reticulata</i>
<i>Lima hians</i>	<i>Littorina neritoides</i>	" <i>incrassata</i>
<i>Pecten opercularis</i>	<i>Rissoa costata</i>	<i>Mangelia purpurea</i>
" <i>pusio</i>	" <i>parva</i>	" <i>striolata</i>
	" <i>purpurea</i>	" <i>linearis</i>
	" <i>crenulata</i>	" <i>nebula</i>
	<i>Turritella tricostralis</i>	<i>Pleurotoma elegans</i>
	<i>Cœcum trachea</i>	
	<i>Cerithium reticulatum</i>	GASTEROPODA OPISTHO-
	" <i>adversum</i>	BRANCHIATA.
	<i>Scalaria clathratula</i>	<i>Cylicha cylindracea</i>
	<i>Eulima polita</i> ?	" <i>mamillata</i>
	<i>Chemnitzia elegantis-</i>	" <i>truncata</i>
	<i>sima</i>	<i>Bulla hydatis</i>
	" <i>rufa</i>	<i>Philine aperta</i>

Being in proportion to the whole number of north of Spain species—

<i>Acephala lamellibranchiata</i> .....	36 in 88, or 41 per cent.
<i>Acephala palliobranchiata</i> .....	— 1, " — "
<i>Gasteropoda prosobranchiata</i> .....	39 " 113, " 35 "
<i>Gasteropoda opisthobranchiata</i> .....	5 " 10, " 50 "

Total, 80 in 212, or 38 per cent.

#### MEDITERRANEAN SEA AND SOUTHERN COASTS OF SPAIN AND PORTUGAL.

One marine fauna is distributed generally throughout the Mediterranean, but many forms found in the East do not extend to its western extremity; and others, generally inhabitants of the Atlantic, seem to have penetrated but a short distance to the eastward of the Straits of Gibraltar. As examples of the former, may be mentioned the genera *Clavigella*, *Thecidia*, *Umbrella*, *Pedicularia*, *Dolium*, *Casidaria*, &c., with numerous species, such as *Venerupis decussatus*, *Trochus Sprattii*, &c.; and of the latter the genera *Ervilia*, *Siphonaria*, *Acmaea*, *Mesalia*, and *Cymba*, with the species *Lutraria elliptica*, *Venus striatula*, *Astarte sulcata*, *Astarte triangularis*, *Natica intricata*, and various others.

Some forms and species appear to have the whole of their range within the limits of the Mediterranean, as *Pedicularia*, *Thecidia*, *Casidaria echinophora*, &c.; while there exist a few, such as *Psammobia costata*, *Ervilia castanea*, *Lithodomus caudigerus*, found on the coasts of the Atlantic, both north and south of the Straits of Gibraltar, but not,

so far as is known, either within or to the eastward of these Straits.

Although various districts of the Mediterranean have been explored, and their fauna described by naturalists eminently qualified for the task, we do not yet possess a general catalogue of the mollusca of that sea. I trust that this desideratum will not remain long unsupplied; in the mean time it may suffice for the object of comparison, to give a list of species collected by myself in the district extending from Faro, at Cape St. Mary's in Algarve, to Carthagera near Cape de Gatt in Murcia, which includes the southwesternmost corner of the European continent.

Species obtained on the south coasts of Spain and Portugal—

<b>ACEPHALA LAMELLI-</b>	<i>Tellina crassa</i>	<i>Venus verrucosa</i>
<b>BRANCHIATA.</b>	" <i>serrata</i>	" <i>fasciata</i>
<i>Gastrochæna cuneiformis</i>	" <i>balaustina</i>	" <i>casina</i>
<i>Saxicava arctica</i>	" <i>incarnata</i>	" <i>ovata</i>
<i>Pholas dactylus</i>	" <i>planata</i>	" — (new)
" <i>candida</i>	" <i>costæ</i>	<i>Artemis exoleta</i>
" <i>parva</i>	" <i>punicea</i>	" <i>lineta</i>
<i>Petricola lithophaga</i>	" <i>fabula</i>	<i>Lucinopsis undata</i>
<i>Venerupis irus</i>	" — (new)	<i>Circe minima</i>
<i>Panopæa Aldobrandi</i>	<i>Syndosmya alba</i>	<i>Astarte sulcata</i>
<i>Corbula nucleus</i>	" <i>prismatica</i>	" <i>incrassata</i>
<i>Necera cuspidata</i>	" <i>intermedia</i>	" <i>triangularis</i>
" <i>costellata</i>	<i>Scrobicularia piperata</i>	<i>Cardium erinaceum</i>
<i>Pandora rostrata</i>	" <i>Cotardi</i>	" <i>rusticum</i>
" <i>obtusa</i>	<i>Donax trunculus</i>	" <i>aculeatum</i>
<i>Thracia phaseolina</i>	" <i>venustus</i>	" <i>Norvegicum</i>
" <i>convexa</i>	" <i>politus</i>	" <i>papillosum</i>
" <i>pubescens</i>	<i>Mesodesma donacilla</i>	" <i>punctulatum?</i>
<i>Solen marginatus</i>	<i>Ervilia castanea</i>	" <i>minimum</i>
" <i>ensis</i>	" — (new)	" <i>echinatum</i>
" <i>siliqua</i>	<i>Mactra subtruncata</i>	" <i>edule</i>
" <i>pellucidus</i>	" <i>helvacea</i>	" <i>pygmaeum</i>
<i>Ceratisolen legumen</i>	" <i>stultorum</i>	" <i>fasciatum</i>
<i>Solecurtus coarctatus</i>	<i>Lutraria elliptica</i>	<i>Cardita sulcata</i>
" <i>strigillatus</i>	" <i>oblonga</i>	" <i>squamosa</i>
" <i>candidus</i>	" <i>rugosa</i>	" <i>calyculata</i>
<i>Solemya Mediterranean</i>	<i>Tapes decussata</i>	" <i>trapezium</i>
<i>Psammobia vespertina</i>	" <i>aurea</i>	<i>Lucina leucoma</i>
" <i>costata</i>	" <i>virginea</i>	" <i>borealis?</i>
" <i>costulata</i>	" <i>Beudantii</i>	" <i>spinifera</i>
" <i>tallinella</i>	" <i>geographica</i>	" <i>digitalis</i>
" <i>Ferroensis</i>	" <i>florida</i>	" <i>divaricata</i>
<i>Diodonta fragilis</i>	<i>Cytheria Chione</i>	" <i>pecten</i>
<i>Tellina tenuis</i>	" <i>Venetiana</i>	" <i>bullata</i>
" <i>pulchella</i>	" — (new)	<i>Ungulina</i> —
" <i>distorta</i>	<i>Venus gallina</i>	<i>Diplodonta rotundata</i>
" <i>donacina</i>	" <i>striatula</i>	<i>Kellia suborbicularis</i>



*Kellia corbuloïdes*  
 " *complanata*  
 " ? — (genus uncertain)  
*Lepton squamosum*  
*Chama gryphoides*  
*Mytilus galloprovincialis*  
 " *Afer*  
 " *minimus*  
*Modiola barbata*  
 " *tulipa*  
 " *vestita*  
 " *petagnæ*  
*Lithodomus dactylus*,  
 (Cadiz)  
 " *caudigerus*,  
 (Faro)  
*Crenella marmorata*  
 " *costulata*  
 " *rhombea*  
*Nucula nucleus*  
 " *nitida*  
 " *radiata*  
 " *decussata*  
*Leda emarginata*  
 " *striata*  
*Area Noë*  
 " *tetragona*  
 " *barbata*  
 " *lactea*  
 " *antiquata*  
 " *raridentata*  
 " *obliqua?*  
 " —  
*Pectunculus glycymeris*  
 " *pilosus* or  
*purpurascens*  
*Avicula Tarantina*  
*Pinna squamosa*  
*Lima subauriculata*  
 " *Loscombii*  
 " *hians*  
 " *scabrella*  
*Pecten maximus*  
 " *opercularis*  
 " *varius*  
 " *pusio*  
 " *polymorphus*

*Pecten gibbus*  
 " *striatus*  
 " *similis*  
 " *pes felis*  
 " *hyalinus*  
*Spondylus gædaropus*  
*Ostrea edulis*  
*Anomia ephippium*  
 " *patelliformis*

## PTEROPODA.

*Hyalæa tricornis*  
*Cleodora cuspidata*

## GASTEROPODA PROSOBRANCHIATA.

*Chiton fascicularis*  
 " *Siculus*  
 " *Rissoi*  
 " *lævis*  
*Patelia vulgata?*  
 " *athletica?*  
 " —  
*Siphonaria concinna*  
*Acmea virginea*  
*Dentalium rubescens*  
 " *Tarentinum*  
 " *dentalis*  
*Pileopsis Ungaricus*  
*Calyptroea Sinensis*  
*Crepidula unguiformis*  
*Fissurella reticulata*  
 " *rosea*  
 " *gibba*  
*Emarginula elongata*  
 " *reticulata*  
*Haliotis tuberculata*  
*Trochus zizyphinus*  
 " *striatus*  
 " *magus*  
 " *granulatus*  
 " *Leugieri*  
 " *conulus*  
 " *tesselatus*  
 " *Richardii*  
 " *divaricatus*  
 " *articulatus*  
 " *Viellotti*

*Trochus fragaroides*  
 " *Montagui*  
 " *dubius?*  
 " *fanulum*  
 " *millegranus*  
 " *canaliculatus*  
 " —  
*Solarium stramineum*  
 " *pseudoscalaris*  
*Turbo rugosus*  
*Phasianella pullus*  
 " *intermedia?*  
*Janthina pallida*  
*Littorina neritoides*  
 " *littoralis*  
 " *tigrina* (Dor.)  
*Rissoa monodonta*  
 " *labiosa*  
 " *parva*  
 " *purpurea*  
 " *striatula*  
 " *Brugieri*  
 " *cimex*  
 " *calathus*  
 " *Montagui*  
 " *lactea*  
 " *crenulata*  
 " *acuta*  
*Turritella communis*  
 " *tricoctalis*  
 " ? (*Aclis?*) *new*  
*Mesalia sulcata*  
 " *striata*  
*Aporrhais pes pelicani*  
*Cerithium vulgatum*  
 " *fuscatum*  
 " *reticulatum*  
 " *adversum*  
*Scalaria communis*  
 " *pseudoscalaris*  
 " *Turtonis*  
 " *crenata*  
 " *clathratulus*  
*Vermetus gigas*  
 " *glomeratus*  
 " *corneus*  
 " *cancellatus*  
 " —

<b>Aclis</b> —	<b>Murex multilamellatus</b>	<b>Mangelia crispata</b>
<b>Eulima polita</b>	<b>Lachesis minima</b>	„ <b>Vauquelina</b>
„ <b>nitida?</b>	<b>Purpura hæmastoma</b>	„ <b>lævigata</b>
„ <b>subulata</b>	<b>Nassa reticulata</b>	„ <b>striolata</b>
„ <b>distorta</b>	„ <b>incrassata</b>	„ —
„ <b>unifasciata?</b>	„ <b>pygmea</b>	<b>Ringuicula auriculata</b>
<b>Chemnitzia elegantissima</b>	„ <b>mutabilis</b>	<b>Mitra ebeneus</b>
„ <b>varicosa</b>	„ <b>neritoides</b>	„ <b>columbellaria</b>
„ <b>scalaris</b>	„ <b>variabilis</b>	„ —
„ <b>rufa</b>	„ <b>trifasciata</b>	<b>Cymba olla</b>
„ —	„ <b>grana</b>	<b>Marginella lævis</b>
„ —	„ —	„ <b>clandestina</b>
„ —	<b>Buccinum minus</b>	„ <b>miliacea</b>
<b>Odostomia conoidea</b>	„ <b>corniculum</b>	„ <b>catena?</b>
„ <b>acuta</b>	„ <b>scriptum</b>	<b>Ovula spelta</b>
„ <b>spiralis</b>	<b>Polia maculosa</b>	„ <b>acuminata</b>
„ — (new)	<b>Cassis sulcosa</b>	<b>Cyprea pyrum</b>
<b>Eulimella Scillæ</b>	„ <b>saburon?</b>	„ <b>moneta?</b>
„ <b>acicula</b>	<b>Fusus pulchellus</b>	„ <b>Europea</b>
<b>Truncatella Montagu</b>	„ <b>rostratus</b>	„ <b>pulex</b>
<b>Natica nitida</b>	„ <b>corneus</b>	<b>Conus Mediterraneus</b>
„ <b>Guilleminii</b>	„ —	<b>GASTEROPODA OPISTHO-</b>
„ <b>intricata</b>	<b>Trophon muricatus</b>	<b>BRANCHIATA.</b>
„ <b>bicallosa?</b>	<b>Triton nodiferum</b>	<b>Cylichna cylindracea</b>
„ <b>sordida</b>	„ <b>olearium?</b>	„ <b>truncata</b>
„ <b>sagra?</b>	„ <b>cutaceum</b>	„ <b>umbilicata</b>
„ <b>macilenta</b>	„ <b>corrugatum</b>	„ <b>strigella</b>
<b>Neritina viridis</b>	<b>Ranella gigantea</b>	„ <b>mamellata</b>
<b>Sigaretus haliotideus</b>	<b>Columbella rustica</b>	„ — (new)
<b>Lamellaria perspicua</b>	<b>Pleurotoma elegans</b>	<b>Tornatella fasciata</b>
<b>Cancellaria cancellata</b>	<b>Mangelia brachystoma</b>	<b>Bulla striata</b>
„ (new)	„ <b>nebula</b>	„ <b>Cranchii</b>
<b>Murex corallinus</b>	„ <b>reticulata</b>	<b>Scaphander lignarius</b>
„ <b>truncatus</b>	„ <b>purpurea</b>	<b>Philine aperta</b>
„ <b>Brandaris</b>	„ <b>Lefroyii</b>	<b>CEPHALOPODA.</b>
„ <b>erinaceus</b>	„ <b>septangularis</b>	<b>Spirula Peronii</b>
„ <b>Edwardsii</b>	„ <b>attenuata</b>	
„ <b>cristatus</b>	„ <b>gracilis</b>	

Being of—

<b>Acephala lamellibranchiata</b> .....	162	} 353 species.
<b>Pteropoda</b> .....	2	
<b>Gasteropoda prosobranchiata</b> .....	177	
<b>Gasteropoda opisthobranchiata</b> .....	11	
<b>Cephalopoda</b> .....	1	

Of these the following only are supposed to extend to North America—

ACEPHALA LAMELLI- BRANCHIATA.	Astarte sulcata Lucina borealis	GASTEROPODA PROSOBRAN- CHIATA. "
Saxicava arctica		Lamellaria perspicua
Solen ensis		Trophon muricatus
		Marginella miliacea

The identity of the two last with European species I conceive to be doubtful. *Lucina flexuosa*, *mytilus edulis*, and *anomia aculeata*, are common to the Mediterranean Sea and North America, though not included in the foregoing list.

The proportion of the south west European species common to the Scandinavian seas is—

Acephala lamellibranchiata .....	55 in 162 or 34 per cent.
Pteropoda .....	— 2 —
Gasteropoda prosobranchiata .....	34 „ 177 „ 19 „
Gasteropoda opisthobranchiata .....	8 „ 11 „ 73 „

Total, 97 in 352, or 28 per cent.

Of the same common to the British seas—

Acephala lamellibranchiata .....	100 in 162 or 61 per cent.
Pteropoda .....	— 2 —
Gasteropoda prosobranchiata .....	60 „ 177 „ 39 „
Gasteropoda opisthobranchiata .....	9 „ 11 „ 82 „

Total, 178 in 352, or 51 per cent.

There have been obtained of them as far north as Vigo—

Acephala lamellibranchiata .....	111 in 162 or 69 per cent.
Pteropoda .....	— 2 —
Gasteropoda prosobranchiata .....	92 „ 177 „ 52 „
Gasteropoda opisthobranchiata .....	9 „ 11 „ 82 „

Together, 212 in 352, or 60 per cent. of the species of the south of Portugal and Spain common to the north of Spain.

It is worthy of notice, that while of 212 species collected in the north of Spain only 29 do not extend to the south of Cape St. Vincent; out of 352 species obtained on the coasts of Portugal and Spain to the south of that Cape, 140 species have not been met with so far north as Vigo.

Following is the proportion of south peninsular species which have been procured in the Canary Islands—

Acephala lamellibranchiata .....	62 in 162 or 38 per cent.
Pteropoda .....	2 " 2 " 100 "
Gasteropoda prosobranchiata .....	75 " 177 " 42 "
Gasteropoda opisthobranchiata .....	7 " 11 " 64 "

Total, 146 in 352, or 41 per cent.

### MOGADOR.

In the month of April, 1852, I spent two days at Mogador, in the south west of Morocco, when I obtained 110 species of mollusca; the following is the list, not previously published—

#### ACEPHALA LAMELLIBRANCHIATA.

	Depth.	Living at	Ground.	Frequency, &c.
<i>Gastrochœna cuneiformis</i>	2 fathoms	—	sand	1 valve
<i>Saxicava artica</i>	35 fath.	—	sand	1 valve
<i>Pholas candida</i>	shore	—	—	valves
<i>Corbula nucleus</i>	35 to 40 f.	35 to 40 f.	fine sand and mud	frequent
<i>Pandora rostrata</i>	3 fathoms	3 fathoms	sand	moderate
" <i>obtusa</i>	35 to 40 f.	35 to 40 f.	fine sand	1 specimen
<i>Thracia</i> (young)	3 fathoms	3 fathoms	sand	1 young
<i>Ceratisolen legumen</i>	shore	—	—	frequent
<i>Psammobia costata</i>	shore	—	—	1 valve
<i>Tellina costæ</i>	shore	—	—	1 valve
" <i>fabula?</i>	3 fathoms	3 fathoms	sand	1 specimen
" <i>tenuis?</i>	3 fathoms	3 fathoms	sand	1 specimen
" —	35 fath.	—	sand	2 valves, species frequent at Madeira
<i>Syndesmya alba</i>	3 to 36 fth	—	sand	valves, frequent
<i>Donax anatinus?</i>	shore	—	sand	frequent
<i>Macra stultorum</i>	shore	—	—	valves
" <i>subtruncata</i>	3 fathoms	3 fathoms	sand	frequent
<i>Lutraria rugosa</i>	shore	—	—	1 valve
<i>Tapes pullastra?</i>	3 fathoms	—	sand	1 specimen
<i>Venus striatula</i>	36 fath.	36 fath.	sand	1 specimen
" (undescribed)	36 fath.	36 fath.	sand	1 specimen
<i>Cardium edule</i>	shore	—	—	rare
" <i>fasciatum</i>	3 fathoms	3 fathoms	sand	1 specimen
" <i>papillosum</i>	3 fathoms	3 fathoms	sand	moderate
<i>Cardita calyculata</i>	shore	—	—	frequent
<i>Lucina flexuosa</i>	36 fath.	36 fath.	sand & m.	1 specimen
" <i>spinifera</i>	36 fath.	36 fath.	sand & m.	frequent
" <i>borealis?</i>	3 fathoms	3 fathoms	sand	1 specimen
" <i>leucoma</i>	3 fathoms	3 fathoms	sand	rare
<i>Montacuta ferruginea</i>	3 fathoms	3 fathoms	sand	rare

	Depth.	Living at	Ground.	Frequency, &c.
Montacuta —	3 fathoms	3 fathoms	sand	rare
Kellia corbuloides	shore	—	—	rare
„ complanata	shore	—	—	1 valve
„ ? —	shore	—	—	valves, species obtained at Faro
Mytilus Galloprovincialis	shore	shore	—	frequent
„ Afer	shore	shore	—	frequent
Modiola barbata	36 fath.	—	sand & m.	1 valve
Crenella costulata	shore	shore	—	2 specimens
Nucula nucleus	3 fathoms	3 fathoms	sand	frequent
Arca lactea	shore	shore	rocks	frequent
Pinna —	36 fath.	—	sand & m.	frequent
Pecten pusio	shore	—	—	valves frequent
Spondylus goedaropus	shore	—	—	valves
Ostrea edulis?	shore	—	—	valves

## GASTEROPODA PROSOBRANCHIATA.

	Depth.	Living at	Ground.	Frequency, &c.
Chiton fascicularis	shore	shore	rocks	frequent, large
„ cinereus	shore	shore	rocks	frequent
„ — (new)	shore	shore	rocks	very frequent, white
Patella —	shore	shore	rocks	frequent
„ —	shore	shore	rocks	frequent
„ pellucida	3 fathoms	3 fathoms	weed	frequent, abundant on laminaria
Siphonaria concinna	shore	shore	rocks	rare
Acmea virginea	3 fathoms	—	sand	frequent
Dentalium Tarentinum	3 fathoms	—	sand	rare
„ dentalis	36 fath.	36 fath.	sand & m.	1 live & 2 dead specimens
Fissurella rosea	shore	shore	rocks	frequent
„ reticulata	shore	shore	rocks	frequent
Haliotis tuberculata	shore	shore	rocks	frequent
Trochus zizyphinus	shore	shore	rocks	frequent
„ cinerarius	shore	shore	rocks	frequent
„ lineatus	shore	shore	rocks	frequent
„ —	shore	shore	rocks	frequent
„ —	shore	shore	rocks	frequent
„ —	shore	shore	rocks	frequent
Adeorbis subcarinatus	3 fathoms	—	sand	4 specimens
Phasianella pullus	3 fathoms	3 fathoms	weed	frequent
Turbo rugosus	3 fathoms	3 fathoms	sand	1 young specimen
„ —	shore	sh. 1 spec.	rocks	frequent
Fossar Adansoni	shore	—	—	1 specimen
Littorina neritea	shore	shore	rocks	frequent

	Depth.	Living at	Ground.	Frequency, &c.
<i>Littorina</i>	shore	—	—	1 specimen
<i>Rissoa crenulata</i>	3 fathoms	—	sand	moderate
„ <i>parva?</i>	shore	—	—	moderate
„ <i>lactea</i>	shore	—	—	2 specimens
<i>Cerithium adersum</i>	3 fathoms	—	—	frequent
„ <i>reticulatum</i>	3 fathoms	—	—	frequent
<i>Turritella communis</i>	36 fath.	—	sand & m.	frequent
<i>Mesalia sulcata</i> var.	3 fathoms	3 fathoms	sand	frequent, 2 or 3 varieties
<i>Scalaria pseudoscalaris</i>	shore	—	—	moderate
„ <i>crenata</i>	shore	—	—	rare
„ <i>elathratula</i>	36 fath.	—	sand & m.	1 specimen
<i>Chemnitzia elegantissima</i>	3 & 40 f.	—	sand & m.	several specimens
<i>Odostoma conoidea</i>	36 fath.	—	sand & m.	several specimens
<i>Natica macilenta</i>	3 fathoms	3 fathoms	sand	rare
<i>Murex coralinus</i>	3 fathoms	3 fathoms	sand	frequent
„ <i>torosus</i>	shore	—	—	frequent
<i>Lachesis minima</i>	shore	shore	rocks	frequent
<i>Purpura homastoma</i>	shore	shore	rocks	frequent
„ ? (new)	3 to 5 fth.	—	sand	several
<i>Nassa reticulata</i>	3 to 5 fth.	3 to 5 fth.	sand	frequent; small size
„ <i>variabilis</i>	shr. to 5 f.	3 to 5 fth.	sand	frequent
„ <i>trifasciata</i>	35 to 40 f.	35 to 40 f.	sand & m.	frequent
„ <i>mutabilis?</i>	shore	shore	rocks	freq.; small, species at Cadiz & Can. Islands
„ <i>scalariformis</i>	2 to 5 fth.	2 to 5 fth.	sand	several
<i>Buccinum corniculum</i>	shore	shore	rocks	frequent
„ <i>minus</i>	shore	shore	rocks	frequent
<i>Mangelia purpurea</i>	3 fathoms	—	sand	rare
„ <i>laevigata</i>	3 fathoms	—	sand	several
„ <i>brachystoma</i>	36 fths.	—	sand & m.	frequent
<i>Columbella Broderippii</i>	3 fathoms	3 fathoms	sand	frequent
<i>Mitra ebenens</i>	shore	shore	rocks	moderate
„ <i>zebrina</i>	shore	—	—	rare
<i>Marginella glabella</i>	shore	—	—	rare
„ (new)	2 to 5 fth.	2 to 5 fth.	sand	very frequent
„ <i>miliacea?</i>	shore	shore	rocks	rare
<i>Ringuicula auriculata</i>	35 to 40 f.	—	sand & m.	frequent

## GASTEROPODA OPISTHOBANCHIATA.

	Depth.	Living at	Ground.	Frequency, &c.
<i>Cylichna cylindracea</i>	3 and 36 f.	—	sand & m.	rare
„ <i>truncata</i>	3 fathoms	—	sand	rare
<i>Tornatella fasciata</i>	shore	—	—	1 specimen
<i>Philine aperta</i>	3 fathoms	3 fathoms	sand	rare; small
<i>Aplysia hybrida?</i>	3 fathoms	3 fathoms	sand	several specimens

It will be seen that the fauna of Mogador, as illustrated by the preceding list, is generally identical with that of the Mediterranean and southern peninsula, and that while a few (*Marginella*, *Mitra zebina*, a *Chiton*, *Columbella Broderippii*, and a *Turlo* unnamed) are probably natives of tropical Africa, and all but the last obtained in the Canaries; others, such as *Tellina fabula*, *Lucina borealis*, *Patella pellucida*, *Trochus crassus*, &c., are typical of a more northern fauna than that of the Mediterranean.

About one-half the species range as far north as Britain, but of 22 of them dredged in 35 to 50 fathoms, (the remainder being littoral or from shallow water,) all but 6 are well-known inhabitants of the British seas.

#### CANARY ISLANDS.

Messrs. Webb and Berthelot, in their valuable work on the Natural History of the Canary Islands, enumerate 124 species of Marine Testaceous Mollusca. During a month that I passed in these Islands, in 1852, I procured the following:—

#### ACEPHALA LAMELLIBRANCHIATA.

	Depth.	Living at	Ground.	Frequency, &c.
<i>Teredo</i>	shore	—	—	frequent; in the stock of an anchor
<i>Gastrochneæ cuneiformis</i>	2 to 60 f.	2 to 60 f.	coral	frequent
<i>Saxicava arctica</i>	12 to 40 f.	12 to 40 f.	sand	not frequent
<i>Venerupis irus</i>	shore	shore	—	frequent
<i>Corbula nucleus</i>	16 fath.	16 fath.	sand & m.	not frequent; Lancerote
<i>Necora cuspidata</i>	20 to 35 f.	25 fath.	mud	rare; Teneriffe
„ <i>costellata</i>	20 to 35 f.	—	mud	valves; Teneriffe
<i>Pandora obtusa</i>	12 to 40 f.	16 fath.	sand	frequent
„ <i>rostrata</i> ?	12 fath.	—	sand	1 valve
<i>Thracia phaseolina</i>	12 to 60 f.	—	sand	not frequent; Orotava
„ <i>pubescens</i>	40 to 60 f.	—	sand	valves?
<i>Solecurtus candidus</i>	12 to 40 f.	—	sand	valves; frequent
„ <i>coarctatus</i>	20 to 40 f.	—	mud	1 specimen, and valves
<i>Solemya mediterranea</i>	12 fath.	12 fath.	m. & weed	rare; Lancerote
<i>Psammobia vespertina</i>	12 fath.	—	sand & m.	frequent; Lancerote
„ <i>costulata</i>	30 to 60 f.	30 to 60 f.	sand & m.	very frequent
„ <i>Ferroensis</i>	30 fath.	—	sand	rare; Teneriffe
<i>Tellina incarnata</i>	sh. to 16 f.	—	sand	frequent; Lancerote
„ <i>distorta</i>	12 to 60 f.	12 to 60 f.	sand	very frequent
„ <i>balanustina</i>	25 fths.	—	mud	1 valve; Teneriffe
„ <i>serrata</i>	12 to 40 f.	20 fath.	mud	rare; dead valves frequent; Teneriffe

	Depth.	Living at	Ground.	Frequency, &c.
<i>Donax anatinus?</i>	shore	—	—	valves
<i>Ervilia castanea</i>	12 to 16 f.	12 to 16 f.	sand & m.	frequent; young; Lancerote
„ — (new)	12 to 16 f.	12 to 16 f.	sand & m.	frequent; Lancerote; species obtained at Gibraltar & Madeira
<i>Macra subtruncata?</i>	12 to 16 f.	—	—	rare; Lancerote
„ <i>stultorum</i>	35 fath.	—	sand	1 valve; Teneriffe
<i>Cytheria chione</i>	12 to 40 f.	12 to 40 f.	sand	frequent
„ <i>Venetiana</i>	20 to 35 f.	—	mud	rare; Teneriffe
„ — (new?)	20 to 35 f.	25 fath.	mud	rare; white; obtained in Mediterranean and Madeira
„ — (new)	50 fath.	50 fath.	sand	1 specimen; Orotava; large, thin, with brown spots
<i>Venus verrucosa</i>	12 to 60 f.	12 to 16 f.	sand & m.	very frequent; small, with much colour
„ <i>casina</i>	20 to 40 f.	20 to 40 f.	sand	frequent; finely laminated and coloured
„ — ?	50 fath.	—	sand	rare; valves
<i>Circe minima</i>	12 to 50 f.	12 to 50 f.	sand	frequent
<i>Astarte incrassata</i>	16 to 70 f.	16 to 70 f.	sand	frequent
„ <i>triangularis</i>	40 to 70 f.	50 fath.	sand	rare; Orotava; small
<i>Cardita calyculata</i>	sh. to 60 f.	shore	rocks	frequent
<i>Cardium echinatum</i>	16 to 20 f.	16 to 20 f.	sand	not frequent
„ <i>rusticum</i>	16 to 40 f.	16 to 40 f.	sand	frequent; small
„ <i>papillosum</i>	12 to 60 f.	12 to 20 f.	s. & weed	frequent; bright colour
„ <i>Norvegicum</i>	30 fath.	—	mud	rare; valves; Teneriffe
„ <i>fasciatum</i>	16 fath.	—	mud	rare
<i>Lucina Adansoni</i>	12 to 16 f.	12 to 16 f.	m. & weed	frequent; Lancerote
„ <i>leucoma</i>	12 to 16 f.	—	m. & weed	frequent; Lancerote
„ <i>flexuosa</i>	20 to 60 f.	—	sand & m.	rare
„ <i>divaricata</i>	16 to 30 f.	—	sand & m.	rare
„ <i>pecten</i>	sh. to 60 f.	—	sand	rare
„ <i>spinifera</i>	20 to 35 f.	20 to 35 f.	sand & m.	frequent
„ <i>transversa</i>	12 to 35 f.	12 fath.	sand & m.	several; Lancerote
„ — (minute)	12 to 16 f.	12 to 16 f.	sand & m.	frequent; yellowish
<i>Diplodonta rotundata</i>	40 to 60 f.	—	sand	rare; Orotava
„ <i>apicalis</i>	12 to 60 f.	—	sand	rare
<i>Kellia rubra</i>	shore	shore	—	very rare; Lancerote
„ <i>suborbicularis</i>	12 to 20 f.	12 to 20 f.	mud	moderate
<i>Modiola tulipa</i>	50 fath.	—	sand	rare
„ —	12 to 50 f.	20 fath.	coral & stone	frequent; allied to <i>M. Petagnæ</i> of Scacchi
<i>Crenella rhombea</i>	12 to 60 f.	12 to 16 f.	gravel & weed	frequent
„ <i>marmorata</i>	50 fath.	—	—	1 valve; Orotava



	Depth.	Living at	Ground.	Frequency, &c.
<i>Chama gryphoides</i>	12 to 60 f.	20 fath.	m. & stones	frequent
<i>Arca lactea</i>	12 fath.	—	—	moderate; valves
„ <i>tetragona</i>	20 to 60 f.	—	sand	frequent; valves; Teneriffe
„ <i>antiquata</i>	20 to 35 f.	—	mud	rare; valves; Teneriffe
„ <i>imbricata</i>	40 fath.	—	sand	1 valve; Orotava
<i>Pectunculus glycymeris</i>	30 to 50 f.	30 to 50 f.	sand & m.	frequent
„ <i>Siculus</i>	30 fath.	30 fath.	sand	frequent
<i>Avicula Tarentina</i>	20 to 50 f.	—	mud	rare; valves
<i>Pinna rudis</i>	sh. to 35 f.	shore	—	rare
<i>Lima squamosa</i>	sh. to 70 f.	—	sand & m.	frequent; valves
„ <i>hians</i>	12 fath.	—	sand & m.	rare; valves
„ <i>subauriculata</i>	12 to 60 f.	—	sand & m.	rare
<i>Pecten maximus</i>	12 to 60 f.	—	sand & coral	frequent; fragments, and young valves
„ <i>opercularis?</i>	40 to 60 f.	50 fath.	sand	rare; 1 living; small
„ <i>corallinoides</i>	12 to 50 f.	16 fath.	coral & wood	moderate
„ <i>pusio</i>	12 to 50 f.	—	sand	frequent; valves
„ <i>pes felis</i>	50 fath.	—	coral	rare; valves
„ <i>gibbus</i>	20 to 40 f.	—	sand & m.	rare
<i>Spondylus gædaropus</i>	sh. to 70 f.	—	—	frequent; valves, and fragments
<i>Ostrea</i> —	30 to 40 f.	30 fath.	sand	rare

## GASTEROPODA PALLIOBRANCHIATA.

	Depth.	Living at	Ground.	Frequency, &c.
<i>Argopecten decollata</i>	60 fath.	—	sand & coral	rare; Orotava
„ <i>truncata</i>	60 fath.	—	sand & coral	rare; Orotava
„ <i>Neapolitana</i>	60 fath.	—	sand & coral	rare; Orotava
„ —	60 fath.	60 fath.	sand & coral	rare; 1 specimen; Orotava

## PTEROPODA.

	Depth.	Living at	Ground.	Frequency, &c.
<i>Hyalæa trispinosa</i>	20 to 50 f.	—	mud	rare
„ <i>tridentata</i>	20 to 50 f.	—	mud	rare
„ <i>vaginella</i>	—	surface	—	rare
<i>Atalanta Peronii</i>	shore	—	—	frequent
<i>Creiseis spinigera</i>	—	surface	—	frequent
„ —	—	surface	—	frequent
„ —	—	surface	—	frequent
<i>Cuvieria</i> —	20 fath.	—	mud	rare
<i>Spirialis</i> —	50 fath.	—	sand	rare

## GASTEROPODA PROSOBRANCHIATA.

	Depth.	Living at	Ground.	Frequency, &c.
<i>Chiton fascicularis</i>	sh. to 20 f.	sh. to 20 f.	rock & w.	frequent; a small variety upon red weed in 12 to 20 fathoms
„ <i>Canariensis</i>	shore	shore	rock	rare; Orotava
„ — (new/)	shore	shore	rock	frequent; same species as at Mogador
<i>Patella crenata</i>	shore	shore	rock	rare
„ <i>guttata</i>	shore	shore	rock	rare
„ <i>Loweii</i>	shore	shore	rock	rare
„ <i>Candei</i>	shore	shore	rock	rare
„ <i>Gussonii</i>	12 to 50 f.	12 fath.	weed	rare
<i>Dentalium dentalis</i>	50 fath.	—	sand	one small specimen; Orotava
„ <i>rubescens</i>	12 to 20 f.	12 to 20 f.	sand & m.	frequent
„ — (new?)	12 to 50 f.	12 fath.	sand	frequent
<i>Umbrella Mediterranea?</i>	40 to 60 f.	—	sand	rare; small
<i>Gadina Garnoti</i>	shore	—	—	rare
<i>Calyptrea Sinensis</i>	16 to 30	30 fath.	sand	rare
<i>Fissurella reticulata</i>	shore	shore	rock	rare
„ <i>gibba</i>	sh. to 60 f.	—	sand	rare
<i>Emarginula elongata</i>	20 to 60 f.	—	sand	rare
„ <i>reticulata</i>	40 to 60 f.	—	sand	rare, small
<i>Haliotis tuberculatus</i>	shore	shore	rocks	frequent
<i>Trochus zizyphinus</i>	40 to 60 f.	—	sand	rare; fragments & young
„ <i>conulus</i>	20 fath.	20 fath.	sand	one specimen; Bocaina channel
„ <i>crenulatus</i>	12 fath.	12 fath.	sand	frequent
„ <i>magus</i>	16 to 20 f.	16 to 20 f.	sand	freq.; Bocaina channel
„ <i>striatus</i>	12 fath.	12 fath.	sand	frequent, Lancerote
„ <i>granulatus</i>	40 to 60 f.	40 to 60 f.	sand	rare; variety; Orotava
„ <i>Sauleyii</i>	shore	shore	rocks	frequent
„ —	shore	shore	rocks	frequent
„ —	shore	shore	rocks	frequent
„ —	60 fath.	—	—	frequent; minute; Orotava
„ —	60 fath.	—	—	frequent; minute; Orotava
„ —	60 fath.	—	—	frequent; minute; Orotava
<i>Monodonta Berthelotti</i>	shore	shore	rocks	moderate
<i>Solarium luteum</i>	shore	—	—	1 specimen; Lancerote
„ —	25 to 60 f.	—	sand & w.	several; Orotava; one Santa Cruz
<i>Turbo rugosus</i>	12 to 60 f	12 to 16 f.	sand & m.	frequent; small
<i>Fossar Adansoni</i>	shore	—	—	rare; Lancerote

	Depth.	Living at	Ground.	Frequency, &c.
<i>Phasianella pullus</i>	12 to 60 f.	—	sand	frequent
<i>Janthina fragilis</i>	shore	surface	—	abundant
" <i>exigua</i>	shore	surface	—	not frequent; small
<i>Littorina striata</i>	high wtr.	high wtr.	rocks	abundant
" <i>affinis</i>	high wtr.	high wtr.	rocks	frequent; probably a variety of preceding
" <i>neritoides</i>	high wtr.	high wtr.	rocks	frequent
<i>Auricula Ferminii?</i>	shore	shore	rocks	frequent
<i>Pedipes</i> —	shore	shore	rocks	rare; Orotava
<i>Rissoa Canariensis</i>	40 to 60 f.	—	sand	frequent; Orotava
" <i>costata</i>	12 to 60 f.	—	sand	frequent; Orotava and Lancerote
" <i>parva</i>	12 fath.	—	sand & m.	frequent; Lancerote
" <i>purpurea</i>	12 fath.	—	sand & m.	frequent; Lancerote
" <i>elata?</i>	40 to 60 f.	—	sand	frequent; Orotava
" <i>textilis</i>	40 to 60 f.	—	sand	frequent; Orotava
" <i>crenulata</i>	12 to 60 f.	—	sand	frequent
" —	40 to 60 f.	—	sand	frequent; Orotava
" —	40 to 60 f.	—	sand	frequent; Orotava
" —	40 to 60 f.	—	sand	frequent; Orotava
" —	40 to 60 f.	—	sand	frequent; Orotava
" —	40 to 60 f.	—	sand	rare; Orotava
" —	40 to 60 f.	—	sand	rare; Orotava
" —	40 to 60 f.	—	sand	rare; Orotava
<i>Jeffreysia?</i> —	12 fath.	—	sand	rare; Lancerote
<i>Skenea</i> —	40 to 60 f.	—	sand	rare; Orotava
<i>Turritella triplicata</i>	12 to 50 f.	12 to 30 f.	sand & m.	frequent; small
<i>Cœcum trachea</i>	50 fath.	—	sand	frequent; Orotava
" <i>glabrum</i>	12 to 50 f.	—	sand	frequent
<i>Cerithium vulgatum</i>	sh. to 16 f.	12 to 16 f.	sand & m.	frequent
" <i>fuscatum</i>	shore	shore	rocks	frequent
" <i>adversum</i>	sh. to 16 f.	shore	rocks	frequent dead, 2 living, at low water; Lancerote
" <i>reticulatum</i>	sh. to 16 f.	—	sand	frequent
" <i>angustum</i>	60 fath.	—	sand	rare, Orotava
<i>Scalaria pseudoscalaris</i>	shore	shore	rocks	frequent
" <i>Webbii</i>	25 fath.	—	mud	rare, Santa Cruz
" <i>cochlea</i>	12 fath.	12 fath.	mud	rare; 1 spec.; Lancerote
" <i>crenata</i>	shore	—	rocks	several
" <i>clathratula?</i>	16 fath.	—	sand	rare
" <i>clathrus</i>	shore	—	—	rare, (1 specimen)
" — (new)	12 to 16 f.	12 to 16 f.	sand & wood	moderate frequency; spire somewhat resembling Chemnitzia
" —	40 to 60 f.	—	sand	rare; concentrically grooved or striated; small

	Depth.	Living at	Ground.	Frequency, &c.
<i>Scalaria</i> —	40 to 60 f.	—	sand	rare; resembling preceding but not striated
" —	25 fath.	—	mud	rare, Santa Cruz
<i>Aclia</i> ? — (new)?	40 to 60 f.	—	sand	rare, Orotava
" — (new)?	12 fath.	—	sand	rare, Lancerote
<i>Eulima distorta</i>	12 to 60 f.	—	sand	rare
" <i>nitida</i>	40 to 60 f.	—	sand	rare; Orotava
" —	40 to 60 f.	—	sand	rare; Orotava
<i>Stilifer</i> —	40 to 60 f.	—	sand	rare; Orotava
" ? —	40 to 60 f.	—	sand	rare; Orotava
<i>Chemnitzia rufa</i>	16 fath.	16 fath.	sand	rare; Lancerote
" <i>elegantissima</i>	sh. to 60 f.	—	sand	moderate
" <i>indistincta</i>	40 to 60 f.	—	sand	rare
" — (new)	40 to 60 f.	—	sand	frequent; small; pupa-shaped, banded, species at Pantellaria
<i>Odostomia conoidalis</i>	12 to 60 f.	—	sand	moderate
" —	40 to 60 f.	—	sand	rare; Orotava
" —	40 to 60 f.	—	sand	rare; Orotava
" —	40 to 60 f.	—	sand	rare; Orotava
" —	40 to 60 f.	—	sand	rare; Orotava
<i>Eulimella Scilla</i>	20 fath.	—	mud	1 specimen; Santa Cruz
<i>Truncatella Montagu</i>	shore	—	—	rare; Lancerote
<i>Scissurella Berthelotti</i>	50 fath.	—	—	very rare; Orotava
<i>Natica porcellana</i>	sh. to 60 f.	12 to 16 f.	sand & m.	frequent
" <i>millepunctata</i>	16 to 40 f.	20 to 40 f.	sand & m.	rare
" <i>sagra</i> ?	20 fath.	—	sand & m.	1 specimen; Santa Cruz
" <i>bicallosa</i>	12 to 16 f.	12 to 16 f.	sand & m.	moderate
" —	sh. to 60 f.	—	sand & m.	rare
<i>Neritina viridis</i>	12 to 16 f.	12 to 16 f.	sand & m.	frequent; Lancerote
<i>Lamellaria perspicua</i>	12 fath.	—	sand & m.	rare; Lancerote
" — (new)	40 to 60 f.	—	sand	rare
<i>Cancellaria</i> — (new)	12 to 20 f.	—	sand	rare; small, white; species at Gibraltar
" — (new)	12 to 20 f.	—	sand	rare; ditto, brown
<i>Cerithiopsis tuberculare</i>	40 to 60 f.	—	sand	rare; Orotava
<i>Ranella lævigata</i>	20 to 60 f.	50 fath.	sand	rare; Orotava; &c.
<i>Murex corallinus</i>	12 to 30 f.	—	sand	rare
" <i>Edwardsii</i>	shore	shore	rocks	frequent; Lancerote
" <i>Brandaris</i>	shore	—	—	rare
" <i>saxatilis</i>	shore	—	—	rare
" —	shore	—	—	rare; white
<i>Purpura hæmastoma</i>	shore	shore	rocks	frequent
" <i>viveratoides</i>	shore	—	—	moderate
<i>Buccinum minus</i>	12 to 16 f.	—	—	frequent
" (new) or <i>Purpura</i>	20 fath.	—	—	1 specimen; Santa Cruz; species at Mogador

	Depth.	Living at	Ground.	Frequency, &c.
<i>Nassa reticulata</i>	sh. & 16 f.	16 fath.	sand	moderate; Lancerote
" <i>incrassata</i>	shore	—	—	frequent; Lancerote
" <i>mutabilis</i> ?	shore	shore	—	frequent; small
" <i>variabilis</i>	shore	—	—	frequent
" <i>Canariensis</i> ?	40 fath.	—	sand	rare; Orotava
" <i>prismatica</i>	20 to 40 f.	30 fath.	mud	frequent
" <i>scalariformis</i> ?	20 fath.	—	mud	rare
<i>Dolium perdix</i>	sh. to 60 f.	—	—	rare; fragments
<i>Terebra</i>	shore	—	—	rare; Grand Canary
<i>Fusus Maroccanus</i>	sh. to 20 f.	—	s. & coral	rare; Lancerote
" <i>rostratus</i>	20 fths.	—	mud	rare; Santa Cruz
" <i>pulchellus</i>	40 fths.	40 fath.	sand	rare; Orotava
<i>Triton nodiferum</i>	shore	—	—	rare; Lancerote
" <i>cutaceum</i>	shore	—	—	rare; Lancerote
" <i>pileare</i>	shore	—	—	rare; Grand Canary
" —	20 to 40 f.	20 to 40 f.	sand	rare
<i>Mangelia purpurea</i>	sh. to 40 f.	—	—	rare
" <i>Lefroyii</i>	12 fths.	—	sand & m.	rare; Lancerote
" <i>striolata</i>	12 to 60 f.	—	sand & m.	moderate
" <i>Vauquelina</i>	sh. & 25 f.	—	sand & m.	moderate; Lancerote
" <i>linearis</i>	12 fths.	—	sand & m.	rare; Lancerote
" <i>ginniniana</i>	12 to 25 f.	—	sand & m.	frequent; Lancerote
" <i>gracilis</i>	20 fths.	—	mud	rare; Santa Cruz
" <i>teres</i>	25 to 60 f.	—	sand & m.	rare; Santa Cruz
" —	40 to 60 f.	—	sand	frequent; Orotava
" —	40 to 60 f.	—	sand	rare; Orotava
<i>Pleurotoma elegans</i>	12 to 60 f.	—	sand & m.	rare
" <i>balteata</i>	50 fths.	50 fath.	sand	1 specimen; Orotava
<i>Mitra columbellaria</i>	12 to 60 f.	—	sand & m.	rare
" <i>fusca</i>	shore	shore	rocks	frequent
" <i>zebrina</i>	shore	shore	rocks	frequent
" —	12 to 30 f.	—	sand & m.	frequent
<i>Columbella rustica</i>	shore	shore	rocks	frequent
" <i>cribella</i>	shore	—	rocks	frequent
" —	12 to 30 f.	—	sand	moderate
<i>Conus Mediterraneus</i>	shore	shore	rocks	frequent; Lancerote, and Grand Canary; not in Tenerife; whiter in colour than Medi- terranean specimens
" <i>papilionaceus</i>	12 & 20 f.	12 fath.	sand & m.	rare
<i>Cypræa spurca</i>	shore	shore	rocks	frequent; dead
" <i>lurida</i>	shore	—	—	rare
" <i>pyrum</i>	shore	—	—	rare
" <i>moneta</i>	shore	—	—	rare
" <i>pulex</i>	12 fths.	—	sand & m.	rare

	Depth.	Living at	Ground.	Frequency, &c.
<i>Cypraea candidula</i> ?	12 to 50 f.	—	sand	moderate; white; very small
<i>Ovula spelta</i> ?	40 to 60 f.	—	sand	rare; Orotava
<i>Marginella glabella</i>	sh. to 15 f.	12 fath.	sand & m.	frequent
„ <i>guancha</i>	20 to 60 f.	—	sand & m.	frequent
„ —	12 to 16 f.	12 to 16 f.	sand & m.	rare
„ —	shore	shore	rocks	rare
„ —	shore	shore	rocks	rare

## GASTEROPODA OPISTHOBRANCHIATA.

	Depth.	Living at	Ground.	Frequency, &c.
<i>Aplysia occellata</i>	shore	shore	rocks	frequent; Orotava
„ <i>hybrida</i> ?	sh. to 12 f.	sh. to 16 f.	rocks & s.	moderate
<i>Cylichna cylindracea</i>	12 to 50 f.	—	sand & m.	frequent
„ <i>truncata</i>	12 to 50 f.	—	sand & m.	frequent
„ <i>mamillata</i>	40 to 60 f.	—	sand	rare; Orotava
„ (new)	12 to 60 f.	—	sand & m.	frequent; white; striated and banded with opaque white
„ (new)	12 & 16 f.	—	sand & m.	rare; species at Carthage, Spain
<i>Philina aperta</i>	12 to 20 f.	12 to 20 f.	sand & m.	rare; Lancerote
<i>Amphispira hyalina</i>	60 fath.	—	sand	rare; Orotava
<i>Bulla ampulla</i>	sh. to 60 f.	—	sand	frequent
„ <i>hydatis</i>	shore	—	—	frequent
„ <i>Cranchii</i>	12 fath.	—	mud	1 specimen; Santa Cruz
„ —	shore	—	—	frequent; Grand Canary

## CEPHALOPODA.

	Depth.	Living at	Ground.	Frequency, &c.
<i>Spirula Peronii</i>	shore	—	—	frequent
Octopus	sh. & 20 f.	sh. & 20 f.	rocks & s.	moderate

Of the 273 species, at least 170 were new to the fauna of the district. Among those recorded in the work before-mentioned are 30, generally of a more southern type, which I did not succeed in procuring. The whole number is composed of—

<i>Acephala lamellibranchiata</i> .....	84	} 302 species, (Two or three doubtful).
<i>Acephala palliobranchiata</i> .....	4	
<i>Pteropoda</i> .....	16	
<i>Gasteropoda prosobranchiata</i> .....	184	
<i>Gasteropoda opisthobranchiata</i> .....	12	
<i>Cephalopoda</i> .....	2	

Only two or three of them are found in North America, viz. : *Saxicava arctica*, *Lucina flexuosa*, *Lamellaria perspicua* ?

The Canary species, common to Scandinavia are—

<i>Acephala lamellibranchiata</i> .....	25 in	84, or 30 per cent.
<i>Acephala palliobranchiata</i> .....	— „ 4, „ — „	
<i>Pteropoda</i> .....	— „ 16, „ — „	
<i>Gasteropoda prosobranchiata</i> .....	19 „ 184, „ 10 „	
<i>Gasteropoda opisthobranchiata</i> ...	6 „ 12, „ 50 „	

Total, 50 in 302, or 17 per cent.

The proportion of Canary species found in the British seas is—

<i>Acephala lamellibranchiata</i> .....	49 in	84, or 58 per cent.
<i>Acephala palliobranchiata</i> .....	— „ 4, „ — „	
<i>Pteropoda</i> .....	1 „ 16, „ 6 „	
<i>Gasteropoda prosobranchiata</i> .....	41 „ 184, „ 22 „	
<i>Gasteropoda opisthobranchiata</i> ...	6 „ 12, „ 50 „	
<i>Cephalopoda</i> .....	— „ 2, „ — „	

Total, 97 in 302, or 32 per cent.

The Canaries have, in common with the north of Spain,—

<i>Acephala lamellibranchiata</i> .....	36 in	84, or 43 per cent.
<i>Acephala palliobranchiata</i> .....	— „ 4, „ — „	
<i>Pteropoda</i> .....	— „ 16, „ — „	
<i>Gasteropoda prosobranchiata</i> .....	39 „ 184, „ 21 „	
<i>Gasteropoda opisthobranchiata</i> ....	5 „ 12, „ 42 „	
<i>Cephalopoda</i> .....	— „ 2, „ — „	

Total 80 in 302, or 60 per cent.

The following species inhabit the Canaries and the Mediterranean, or south coast of Spain and Portugal.

ACEPHALA LAMELLI-BRANCHIATA.	<i>Psammobia costulata</i>	<i>Astarte incrassata</i>
<i>Teredo navalis</i> ?	„ <i>Ferroensis</i>	„ <i>triangularis</i>
<i>Gastrochœna cuneiformis</i>	<i>Tellina incarnata</i>	<i>Cardita calyculata</i>
<i>Saxicava arctica</i>	„ <i>distorta</i>	„ <i>corbis</i> ?
<i>Venerupis irus</i>	„ <i>balaustina</i>	<i>Cardium echinatum</i>
<i>Corbula nucleus</i>	„ <i>serrata</i>	„ <i>rusticum</i>
<i>Necera costella</i>	<i>Ervilia castanea</i>	„ <i>papillosum</i>
„ <i>cuspidata</i>	„ —	„ <i>Norvegicum</i>
<i>Pandora obtusa</i>	<i>Macra subtruncata</i>	„ <i>fasciatum</i>
„ <i>rostrata</i>	„ <i>stultorum</i>	<i>Lucina leucoma</i>
<i>Thracia phaseolina</i>	<i>Lutraria rugosa</i>	„ <i>flexuosa</i>
„ <i>pubescens</i>	<i>Cytheria chione</i>	„ <i>divaricata</i>
<i>Solecurtus candidus</i>	„ <i>Venetiana</i>	„ <i>pecten</i>
„ <i>coarctatus</i>	„ —	„ <i>spinifera</i>
<i>Solemya Mediterranea</i>	<i>Venus verrucosa</i>	<i>Diplodonta rotundata</i>
<i>Psammobia vespertina</i>	„ <i>casina</i>	„ <i>apicalis</i>
	<i>Circe minima</i>	<i>Kellia suborbicularis</i>

*Kellia rubra*  
*Modiola tulipa*  
*Crenella rhombea*  
 „ *marmorata*  
*Chama gryphoides*  
*Arca lactea*  
 „ *tetragona*  
 „ *imbricata*  
 „ *antiquata*  
 „ *Noe*  
*Pectunculus glycymeris*  
 „ *Siculus*  
*Avicula Tarentina*  
*Pinna rudis*  
*Lima squamosa*  
 „ *hians*  
 „ *subauriculata*  
*Pecten Jacobæus*  
 „ *opercularis*  
 „ *pusio*  
 „ *pes felis*  
 „ *gibbus*  
*Spondylus goedaropus*

ACEPHALA PALLIO-  
BRANCHIATA.

*Argopecten truncata*  
 „ *decollata*  
 „ *Neapolitana*  
 „ —

PTEROPODA.

*Hyalaea trispinosa*  
 „ *tridentata*  
 „ *vaginella*  
*Creiseis spinigera*

„ —

„ —

*Atalanta Peronii*

GASTEROPODA PROSO-  
BRANCHIATA.

*Chiton fascicularis*  
*Patella Gussonii*  
*Dentalium dentalis*  
 „ *rubescens*  
 „ —

*Gadinia Garnoti* ?

*Calyptroea Sinensis*

*Fissurella reticulata*

„ *gibba*

*Emarginula reticulata*

„ *elongata*

F\*

*Haliotis tuberculata*  
*Trochus exiguus*  
 „ *striatus*  
 „ *magus*  
 „ *conulus*  
 „ *granulatus*  
 „ *zizyphinus*  
 „ —

„ —

*Solarium luteum* ?

*Turbo rugosus*

*Fossar Adansonii*

*Phasianella pullus*

*Littorina neritoides*

*Rissoa costata*

„ *parva*

„ *purpurea*

„ *elata* ?

„ *textilis* ?

„ *crenulata*

*Skenia* — ?

*Turritella triplicata*

*Coecum trachea*

„ *glabrum*

*Cerithium vulgatum*

„ *fuscatum*

„ *adversum*

„ *reticulatum*

„ *angustinum*

*Scalaria pseudoscalaris*

„ *crenata*

„ *clathratula*

*Eulima distorta*

„ *nitida*

*Chemnitzia rufa*

„ *elegantissima*

„ *indistincta*

„ — (undescribed)

*Odostomia conoidea*

„ —

„ —

*Eulimella Scilloe*

*Truncatella Montagu*

*Natica millepunctata*

„ *sagra* ?

„ *bicallosa* ?

*Neritina viridis*

*Lamellaria perspicua*

*Cancellaria* — (unde-

scribed)

*Cerithiopsis tuberculare*

*Murex brandaris*  
 „ *corallinus*  
 „ *Edwardsil*  
 „ *trunculus*  
*Purpura hœmastoma*  
*Buccinum minus*  
*Nassa reticulata*  
 „ *incrassata*  
 „ *mutabilis* ?  
 „ *variabilis*  
 „ *prismatica*  
 „ *scalariformis*  
*Dolium galea*  
*Fusus rostratus*  
 „ *pulchellus*  
*Triton nodiferum*  
 „ *cutaceum*  
*Mangelia purpurea*  
 „ *Lefroyii*  
 „ *striolata*  
 „ *Vauquelina*  
 „ *linearis*  
 „ *nebula*  
 „ *gracilis*  
 „ *teres*  
*Pleurotoma elegans*  
 „ *balteata*  
*Mitra ebenea*  
 „ *columbellaria*  
*Columbella rustica*  
*Conus Mediterraneus*  
*Cypraea spurca*  
 „ *lurida*  
 „ *pyrum*  
 „ *moneta*  
 „ *pulex*  
*Ovula spelta*

GASTEROPODA OPISTHO-  
BRANCHIATA.

*Cylicchna cylindracea*  
 „ *truncata*  
 „ *mamillata*  
 „ —

*Bulla hydatis*

„ *Cranchii*

*Aplysia hybrida*

*Umbrella Mediterranea*

CEPHALOPODA.

*Spirula Peronii*

*Argonauta Argo*



The proportion which these bear to the Canary species is—

Acephala lamellibranchiata.....	72	in 84,	or 76 per cent.
Acephala palliobranchiata .....	4	„ 4, „	100 „
Pteropoda .....	7	„ 16, „	44 „
Gasteropoda prosobranchiata .....	97	„ 184, „	53 „
Gasteropoda opisthobranchiata ..	8	„ 12, „	67 „
Cephalopoda.....	2	„ 2, „	100 „

Total 190 in 302, or 63 per cent.

The Canary species which have not been found in the south of Europe or Mediterranean are generally of more southern type, and such of them as are not already known inhabitants of Western Tropical Africa, will probably prove to be so. Of these, the species of *Pedipes* is found in Fayal, *Littorina Striata* and *Mitra fusca* in Madeira and the Azores, *Modiola* (unnamed), *Pecten corallinoides*, *Patella crenata*, *P. guttata*, *P. Loweii*, *P. Candei*, *Monodonta Bertheloti*, a *Solarium*, *Scalaria cochlea*, *Eulima?* (new), *Natica porcellana*, and another *Natica*, a new *Cancellaria* *Mitra zebrina*, and another *Mitra*, *Cypræa candidula?* *Marginella guancha*, and an undescribed *Cylichna* extend to Madeira. *Neritina viridis*, and *Columbella cribraria* are common to the Canary, Madeira, and West India Islands.

The marine fauna of the Canary Islands is characterized by the presence of numerous species of *Scalaria*, and by the absence of all representatives of the genera *Nucula*, *Leda*, and *Anomia*.

#### MADEIRA.

During a few days spent in the Madeira Islands I obtained 156 species of marine testaceous Mollusca.

#### ACEPHALA LAMELLIBRANCHIATA.

	Depth.	Living at	Ground.	Frequency, &c.
<i>Gastrochoena cuneiformis</i>	20 fath.	sand & m.	sand & m.	1 valve
<i>Saxicava arctica</i>	20 fath.	—	sand & m.	1 valve
<i>Venerupis irus</i>	20 fath.	—	sand & m.	1 valve
<i>Necera cuspidata</i>	18 to 24 f.	20 fath.	sand & m.	rare
„ <i>costellata</i>	18 to 24 f.	24 fath.	sand & m.	rare
<i>Poromya granulata</i>	20 fath.	—	sand & m.	1 valve
<i>Lyonsia Norvegica</i>	20 fath.	20 fath.	sand & m.	
<i>Thracia phaseolina</i>	15 to 24 f.	—	sand & m.	valves
<i>Solecurtus candidus</i>	20 fath.	—	sand & m.	valves
„ <i>coarctatus</i>	20 fath.	—	sand & m.	valves
<i>Tellina incarnata</i>	20 fath.	—	sand & m.	valves

	Depth.	Living at	Ground.	Frequency, &c.
<i>Tellina distorta</i>	15 to 24 f.	20 fath.	sand	rare
„ <i>balauistina</i>	20 fath.	—	sand & m.	rare; valves
„ <i>donacina</i>	20 fath.	—	sand & m.	rare; valves
„ —	18 to 24 f.	—	sand & m.	frequent; species obtained off Mogador
<i>Psammobia costulata</i>	15 to 20 f.	15 to 20 f.	sand	frequent
<i>Ervilia castanea</i>	15 to 20 f.	15 to 20 f.	sand	moderate
„ — (new)	15 to 20 f.	15 to 20 f.	sand	moderate; species obtained at Lancerote and Gibraltar
<i>Cytheria chione</i>	15 to 24 f.	15 to 24 f.	sand & m.	frequent
„ — (new)	18 to 24 f.	18 to 24 f.	sand & m.	moderate
<i>Venus verrucosa</i>	20 fath.	20 fath.	sand & m.	rare
„ <i>casina</i>	15 to 20 f.	15 to 20 f.	s. & coral	abundant
<i>Circe minima</i>	15 to 20 f.	15 to 20 f.	sand & m.	frequent
<i>Cardium echinatum</i>	18 to 24 f.	18 to 24 f.	sand & m.	rare; young
„ <i>rusticum</i>	18 to 24 f.	18 to 24 f.	sand & m.	moderate
„ <i>papillosum</i>	18 to 24 f.	18 to 24 f.	sand & m.	moderate
„ <i>Norvegicum</i>	18 to 24 f.	—	sand & m.	rare
„ —	18 to 24 f.	—	sand & m.	valves; small; oval
<i>Cardita calyculata</i>	sh. & 15 f	shore	sand	frequent; on shore
<i>Lucina spinifera</i>	18 to 24 f.	20 fath.	sand & m.	rare
„ <i>divaricata</i>	15 & 20 f.	—	sand	rare
„ <i>pecten</i>	15 fath.	—	sand	rare
„ — (new) ?	20 fath.	20 fath.	sand & m.	frequent; minute
<i>Diplodonta rotundata</i>	20 fath.	—	sand & m.	rare
„ <i>apicalis</i>	20 fath.	20 fath.	sand & m.	rare
<i>Kellia rubra</i>	20 fath.	—	sand & m.	1 valve
<i>Modiola</i> —	20 fath.	20 fath.	in mullpore	rare
<i>Arca tetragona</i>	20 fath.	20 fath.	s. & coral	rare; but frequent valves
<i>Pectunculus glycymeris</i>	15 to 20 f	15 to 20 f.	sand	frequent
„ <i>Siculus</i>	15 to 20 f.	15 to 20 f.	sand	frequent
<i>Avicula Tarentina</i>	24 fath.	—	mud	rare
<i>Pinna squamosa</i>	shore	shore	gravel	1 specimen
<i>Lima squamosa</i>	sh. & 15 to 20 f.	shore	s. & coral	one living; and valves
„ <i>hians</i>	20 to 24 f.	—	sand & m.	valves
<i>Pecten maximus</i>	18 to 24 f.	20 fath.	sand & m.	rare; young
„ <i>pusio</i>	15 to 24 f.	—	sand & m.	valves
„ <i>similis</i>	18 to 24 f.	18 to 24 f.	sand & m.	frequent
„ <i>corallinoides</i>	sh. to 24 f.	—	s. & coral	frequent; valves
„ <i>polymorphus</i>	15 to 24 f.	—	sand & m.	valves
„ <i>pes felis</i>	18 to 24 f.	—	sand & m.	valves
„ <i>opercularis</i>	18 fath.	18 fath.	sand	one; minute
„ <i>gibbus</i>	20 fath.	—	sand & m.	two (from stomach of fish,) and valves
<i>Ostrea</i> —	20 fath.	—	sand & m.	rare
<i>Anomia ephippium</i>	shore	—	—	rare

## GASTEROPODA PALLIOBRANCHIATA.

	Depth.	Living at	Ground.	Frequency, &c.
<i>Argopecten decollata</i>	20 fath.	—	sand & m.	local

## PTEROPODA.

	Depth.	Living at	Ground.	Frequency, &c.
<i>Hyalæa tridentata</i>	20 fath.	—	sand & m.	one specimen
" <i>trispinosa</i>	20 fath.	—	sand & m.	rare
" <i>vaginella</i>	20 fath.	—	sand & m.	rare
" —	20 fath.	—	sand & m.	rare
<i>Cuvieria</i>	20 fath.	—	sand & m.	one

## GASTEROPODA PROSOBRANCHIATA.

	Depth.	Living at	Ground.	Frequency, &c.
<i>Chiton fascicularis</i>	shore	shore	rocks	frequent
" — (valves)	15 to 20 f.	—	sand	frequent
<i>Patella Gussonii</i>	15 to 20 f.	—	sand	frequent
" <i>guttata</i> ?	shore	shore	rocks	} abundant on the De- zertias
" <i>crenata</i>	shore	shore	rocks	
" <i>Loweii</i>	shore	shore	rocks	
" <i>Candei</i>	shore	shore	rocks	
" <i>tenuis</i> (Dillwyn)	shore	shore	rocks	
<i>Dentalium dentalis</i>	18 to 24 f.	18 to 24 f.	mud	frequent
<i>Calyptræa Sinensis</i>	18 to 24 f.	18 to 24 f.	m. & sand	rare
<i>Fissurella reticulata</i>	18 to 24 f.	—	sand & m.	rare
<i>Emarginula</i> — (new?)	sh. to 20 f.	sh. & 20 f.	sand & m.	frequent
" — (new?)	sh. & 20 f.	sh. & 20 f.	sand & m.	frequent
" <i>reticulata</i>	18 to 24 f.	—	sand & m.	rare
<i>Haliotis tuberculata</i>	shore	shore	rocks	frequent
<i>Trochus zizyphinus</i>	15 to 20 f.	—	s. & coral	rare
" <i>conulus</i>	20 fath.	—	mud	one specimen
" <i>crenulatus</i>	15 to 20 f.	—	sand & m.	frequent
" <i>magus</i>	15 to 20 f.	15 to 20 f.	s. & coral	frequent; small
" <i>striatus</i>	15 to 20 f.	—	s. & coral	frequent
" <i>granulatus</i>	20 fath.	—	mud	rare
<i>Monodonta Bertheloti</i>	shore	shore	rocks	rare
<i>Solarium</i> —	20 fath.	—	mud	rare; small
<i>Bifrontia Zancleæ</i>	18 to 24 f.	18 to 24 f.	sand & m.	frequent
<i>Janthina communis</i>	shore	—	—	frequent
" <i>pallida</i>	shore	—	—	frequent
" <i>exigua</i>	shore	—	—	rare
<i>Turbo rugosus</i>	15 to 20 f.	—	s. & coral	frequent; small

	Depth.	Living at	Ground.	Frequency, &c.
<i>Phasianella pullus</i>	15 to 20 f.	—	s. & coral	frequent
<i>Littorina striata</i>	shore	shore	rocks	frequent
„ <i>neritoides</i>	shore	shore	rocks	frequent
<i>Rissoa purpurea</i>	18 to 24 f.	—	sand & m.	rare
„ <i>crenulata</i>	15 to 24 f.	—	sand & m.	moderate
„ —	18 to 24 f.	18 to 24 f.	sand & m.	frequent
„ —	18 to 24 f.	18 to 24 f.	sand & m.	moderate
„ —	18 to 24 f.	—	sand & m.	moderate
<i>Cerithium reticulatum</i>	15 to 24 f.	—	sand & m.	frequent
„ <i>adversum</i>	15 to 20 f.	—	s. & coral	frequent
„ <i>angustum</i>	15 to 20 f.	—	s. & coral	rare
<i>Turritella?</i> ( <i>Aclis?</i> )--new	20 fath.	—	mud	rare
„ „ new	20 fath.	—	mud	rare
<i>Mesalia striata?</i>	20 fath.	—	mud	rare; (one)
<i>Scalaria Turtonis</i>	18 to 24 f.	18 to 24 f.	sand & m.	moderate
„ <i>cochlea</i>	18 fath.	18 fath.	s. & coral	rare; (one) Porto Santo
„ —	20 fath.	—	sand & m.	rare; small
<i>Eulima subulata</i>	18 to 24 f.	18 to 24 f.	sand & m.	moderate
„ <i>nitida</i>	18 to 24 f.	—	sand & m.	rare
„ <i>distorta</i>	18 to 24 f.	—	sand & m.	rare
„ — ?	18 fath.	—	sand & m.	rare
<i>Chemnitzia rufa</i>	18 to 24 f.	18 to 24 f.	sand & m.	frequent
„ <i>elegantissima</i>	18 to 24 f.	—	sand & m.	moderate
„ —	18 to 24 f.	—	sand & m.	rare; species obtained in Canaries, and at Pantellaria
<i>Eulimella Scille</i>	18 to 24 f.	—	sand & m.	rare
<i>Natica Porcellana</i>	18 to 24 f.	—	sand & m.	moderate
„ — (new?)	11 to 24 f.	—	sand & m.	frequent
<i>Lamellaria perspicua</i>	15 fath.	—	sand	rare; one specimen
<i>Neritina viridis</i>	15 to 20 f.	—	sand & m.	frequent
<i>Cancellaria</i> — (new)	15 to 20 f.	—	sand	rare; small white
„ — (new)	15 to 20 f.	—	sand	rare; small brown
<i>Murex corallinus</i>	15 to 20 f.	—	sand	rare
„ <i>Edwardsii</i>	15 fath.	—	sand	one specimen
„ <i>cristatus</i>	shore	—	—	rare
„ <i>erinaceus</i>	shore	shore	rocks	frequent
„ ? —	shore	shore	rocks	rare; species obtained in Canaries
<i>Cassia sulcosa</i>	20 fath.	—	sand & m.	rare
<i>Buccinum minus</i>	15 to 20 f.	—	sand	rare
<i>Nassa prismatica</i>	18 to 24 f.	—	sand & m.	rare
„ <i>incrassata</i>	sh. to 20 f.	shore	sand & m.	frequent
„ <i>variabilis</i>	sh. to 20 f.	—	—	frequent
<i>Triton pileare</i>	shore	—	—	one specimen
<i>Mangelia teres</i>	18 to 24 f.	18 to 24 f.	sand & m.	rare
„ <i>secalina</i>	18 to 24 f.	—	sand & m.	rare

	Depth.	Living at	Ground.	Frequency, &c.
<i>Mangelia Vauquelina</i>	18 to 24 f.	—	sand & m.	moderate
" <i>nebula</i>	18 to 24 f.	18 to 24 f.	sand & m.	frequent
" <i>gracilis</i>	18 to 24 f.	—	sand & m.	rare
" <i>variegata</i>	18 to 24 f.	—	sand & m.	rare
" <i>linearis</i>	18 to 24 f.	—	sand & m.	rare
" <i>purpuera</i>	18 to 24 f.	—	sand & m.	rare; one specimen
" —	18 to 24 f.	—	sand & m.	rare
<i>Lachesis minima</i>	shore	—	—	moderate
<i>Mitra zebrina</i>	sh. to 20 f.	shore	—	moderate
" <i>fusca</i>	shore	shore	—	frequent
" —	15 to 20 f.	—	sand	frequent; species obtained in Canaries
<i>Cypraea pulex</i>	18 to 24 f.	—	sand & m.	rare
" <i>candidula</i>	15 to 24 f.	—	sand & m.	rare; very small
<i>Columbella rustica</i>	sh. to 20 f.	shore	rocks	frequent
" <i>cribraria</i>	shore	shore	rocks	frequent
" —	18 to 24 f.	—	sand & m.	moderate
<i>Marginella guancha</i>	15 to 24 f.	—	sand & m.	frequent
" <i>miliaria</i>	15 to 20 f.	—	sand & m.	rare
<i>Ringuicula auriculata</i>	15 to 24 f.	20 to 24 f.	sand & m.	frequent

## GASTEROPODA OPISTHOBRANCHIATA.

	Depth.	Living at	Ground.	Frequency, &c.
<i>Cylichna cylindracea</i>	18 to 24 f.	—	sand & m.	rare
" —	15 to 24 f.	—	sand & m.	frequent; species obtained in Canaries
" —	18 to 24 f.	—	sand & m.	rare
<i>Bulla ampulla</i>	20 fath.	—	sand & m.	a fragment
<i>Amphispira hyalina</i>	20 fath.	—	sand & m.	one specimen
<i>Philine aperta</i>	18 to 24 f.	—	sand & m.	rare

## ANELIDES.

	Depth.	Living at	Ground.	Frequency, &c.
<i>Diturpa subulata</i>	20 to 24 f.	20 to 24 f.	sand & m.	extremely abundant

Being—

<i>Acephala lamellibranchiata</i> .....	54	} 156 Species.
<i>Acephala palliobranchiata</i> ...	1	
<i>Pteropoda</i> .....	5	
<i>Gasteropoda prosobranchiata</i> .....	90	
<i>Gasteropoda opisthobranchiata</i> .....	6	

Of these all that are recorded as North American species are *Saxicava arctica*, *Janthina communis*, *Lamellaria perspicua*.

The following species are common to Madeira, and Scandinavia.

<b>ACEPHALA LAMELLI- BRANCHIATA.</b>	<i>Pecten pusio</i> " <i>opercularis</i> " <i>maximus</i> <i>Anomia ephippium</i>	<i>Chemnitzia rufa</i> <i>Eulimella Scillo</i> <i>Lamellaria perspicua</i> <i>Murex erinaceus</i> <i>Nassa incrassata</i> <i>Mangelia teres</i> " <i>nebula</i> " <i>linearis</i>
<i>Saxicava arctica</i> <i>Necera cuspidata</i> " <i>costellata</i> <i>Lyonsia Norvegica</i> <i>Thracia phaseolina</i> <i>Solecurtus coarctatus</i> <i>Venus casina</i> <i>Cardium Norvegicum</i> " <i>echinatum</i> <i>Lucina spinifera</i> <i>Arca tetragona</i> <i>Lima hians</i>	<b>GASTEROPODA PROSO- BRANCHIATA.</b> <i>Trochus zizyphinus</i> <i>Littorina neritoides</i> <i>Cerithium reticulatum</i> " <i>adversum</i> <i>Scalaria Turtonis</i> <i>Eulima subulata</i> " <i>nitida</i>	<b>GASTEROPODA OPISTHO- BRANCHIATA.</b> <i>Cylichna cylindracea</i> <i>Amphispira hyalina</i> <i>Philine aperta</i>

Being of the Madeira species—

<i>Acephala lamellibranchiata</i> .....	16 in 54, or 30 per cent.
<i>Acephala palliobranchiata</i> .....	— " 1, " — "
<i>Pteropoda</i> .....	— 5, — "
<i>Gasteropoda prosobranchiata</i> .....	15 " 90, " 17 "
<i>Gasteropoda opisthobranchiata</i> .....	3 6, " 50

Total 34 in 156, or 21 per cent. of Madeira species common to Scandinavia.

Madeira possesses, in common with the British seas—

<b>ACEPHALA LAMELLI- BRANCHIATA.</b>	<i>Cardium Norvegicum</i> <i>Lucina spinifera</i> " <i>divaricata</i> <i>Diplodonta rotundata</i> <i>Kellia rubra</i> <i>Arca tetragona</i> <i>Pectunculus glycymeris</i> <i>Avicula Tarentina</i> <i>Lima hians</i> <i>Pecten maximus</i> " <i>pusio</i> " <i>similis</i> " <i>opercularis</i> ?	<i>Emarginula reticulata</i> <i>Haliotis tuberculata</i> <i>Trochus zizyphinus</i> " <i>magus</i> " <i>granulatus</i> " <i>striatus</i> <i>Janthina communis</i> " <i>pallida</i> " <i>exigua</i> <i>Phasianella pullus</i> <i>Rissoa crenulata</i> " — <i>Cerithium reticulatum</i> " <i>adversum</i> <i>Scalaria Turtonis</i> <i>Eulima subulata</i> " <i>nitida</i> " <i>distorta</i> <i>Chemnitzia rufa</i> <i>Eulimella Scillo</i> <i>Lamellaria perspicua</i> <i>Murex corallinus</i>
<i>Saxicava arctica</i> <i>Venerupis irus</i> <i>Necera cuspidata</i> " <i>costellata</i> <i>Poromya granulata</i> <i>Lyonsia Norvegica</i> <i>Thracia phaseolina</i> <i>Solecurtus candidus</i> " <i>coarctatus</i> <i>Tellina incarnata</i> " <i>donacina</i> " <i>balaustina</i> <i>Psammobia costulata</i> <i>Ervilia castanea</i> <i>Cytheria chione</i> <i>Venus verrucosa</i> " <i>casina</i> <i>Circe minima</i> <i>Cardium echinatum</i> " <i>rusticum</i>	<b>PTEPOPODA.</b> <i>Hyalaea trispinosa</i>  <b>GASTEROPODA PROSO- BRANCHIATA.</b> <i>Chiton fascicularis</i> <i>Calyptroea Sinensis</i> <i>Fissurella reticulata</i>	

Murex erinaceus	Mangelia linearis	GASTEROPODA OPISTHO-
Nassa incrassata	" gracilis	BRANCHIATA.
Mangelia teres	Lachesis minima	Cylichna cylindracea
" nebula		Amphispira hyalina
" striolata		Philine aperta

Being—

Acephala lamellibranchiata .....	33 in 44, or 61 per cent.
Acephala palliobranchiata .....	— " 1, " — "
Pteropoda .....	1 " 5, " 20 "
Gasteropoda prosobranchiata ...	33 " 90, " 37 "
Gasteropoda opisthobranchiata ..	3 " 6, " 50 "

Total of Madeira species common to the British seas, 69 in 156, or 44 per cent.

All the species common to Madeira and Britain are likewise to be found in the Mediterranean and Lusitanian district, with addition of the following :—

ACEPHALA LAMELLI- BRANCHIATA.	ACEPHALA PALLIO- BRANCHIATA.	Cancellaria, undescribed
Gastrochaena cuneiformis	Argoipe decollata	Murex Edwardsii
Tellina distorta	PTEROPODA.	" cristatus
Ervilia —	Hyalœa tridentata	Cassis sulcosa
Cytheria —	" vaginella	Buccinum minus
Cardium papillosum	GASTEROPODA PROSO-	Nassa prismatica
Cardita calyculata	BRANCHIATA.	" variabilis
Lucina pecten	Patella Gussonii	Mangelia Vauquelina
Diplodonta apicalis	Dentalium dentalis	" secalina
Pectunculus Siculus	Trochus crenulatus	" variegata
Pinna squamosa	" conulus	Cyprœa pulex
Lima squamosa	Turbo rugosus	Columbella rustica
Pecten polymorphus	Rissoa purpurea	Marginella miliacea
" pes felis	Cerithium angustinum	Ringuicula auriculata
" gibbus	Mesalia striata	GASTEROPODA OPISTHO-
	Neritina viridis	BRANCHIATA.
		Cylichna —

Making of Madeira species common to the Mediterranean and Peninsula ;

Acephala lamellibranchiata .....	47 in 54, or 87 per cent.
Acephala palliobranchiata .....	1 " 1, " 100 "
Pteropoda .....	3 " 5, " 60 "
Gasteropoda prosobranchiata .....	55 " 90, " 61 "
Gasteropoda opisthobranchiata .....	4 " 6, " 67 "

Total 110 in 156, or 70 per cent.

All the Madeira species were obtained in the Canary Islands, except the following :—

ACEPHALA LAMELLI-	PTEROPODA.	Rissoa —
BRANCHIATA.	Hyalœa tridentata	" —
Poromya granulata	" —	Turritella? (Aclis?) —
Lyonsia Norvegica	GASTEROPODA PROSO-	" " —
Tellina donacina	BRANCHIATA.	Mesalia striata
" —	Chiton — ?	Scalaria Turtonis
Lucina —	Patella tenuis	" —
Pecten similis	Emarginula —	Murex erinaceus
" polymorphus	" —	Mangelia variegata
Anomia ephippium	Bifrontia Zancloœa	" secalina
	Janthina pallida	Amphispira hyalina

Consequently the Madeira species common to the Canaries are—

Acephala lamellibranchiata	.....	46 in 54, or	85 per cent.
Acephala palliobranchiata	.....	1 " 1, "	100 "
Pteropoda	.....	3 " 5, "	60 "
Gasteropoda prosobranchiata	...	73 " 90, "	81 "
Gasteropoda opisthobranchiata	...	6 " 6, "	100 "

Total, 129 in 156, or 83 per cent.

From the foregoing statements it will appear that several species and forms typical of the Arctic fauna range far to the southward, while scarcely one of those characteristic of warm latitudes extends into high northern regions. This would appear in a still greater degree, were the more southern districts as thoroughly explored as have been the coasts of Britain, and the fact that such has not been the case should always be borne in mind when drawing a comparison between the Mollusca of Britain and of foreign countries. It will also be seen that the Acephala, animals gifted with smaller power of locomotion, are more widely distributed than the Gasteropoda.

I now proceed to give the result of my observations regarding the particular points at which certain species and forms reach the extreme limit of their range, northward or southward.

Although, as already remarked, the transition from one fauna to another is effected gradually, yet there are certain geographical points at which a considerable change is observed to take place. The following northern species reach their most southern habitat about the northern and central parts of the British seas, though a few of them re-appear on the Nymph bank, a kind of Arctic outpost off the south of Ireland.

Panopœa Norvegica, North Sea	Crenella nigra, North Sea, Hebrides
Tellina proxima, "	" decussata, " "
Astarte elliptica, Clyde and North Sea	Nucula tenuis, Scotland, Irish Sea
" arctica, Zetland	Leda pygmoœa, Hebrides
Cardium Suecicum, Irish Sea	Pecten niveus, "



Anomia striata, Hebrides	Cerithium metula, Zetland
Hippothyris psittacea, North Sea	Scalaria Greenlandica, North Sea
Terebratula cranium, Zetland	Chemnitzia rufescens, Clyde
Chiton Hanleyi, North Sea, Hebrides	Natica helicoides, Orkney & North Sea
„ marmoreus, „ „	„ pusilla, North Sea
Acmaea testudinalis, Irish Sea	Velutina flexilis, „
Pygidium fulvum, Clyde & S. of Ireland	Trichotropis borealis, South of Scotland
Propylidium ancyloide, „	Fusus berniciensis, North Sea
Puncturella noachina, „	„ Norvegicus, „
Emarginula crassa, Carnarvonshire	„ Turtoni, „
Trochus alabastrum, Orkney	Trophon clathratus, Irish Sea
„ undulatus, Hebrides	„ Barvicensis, North Sea
„ helicinus, Hebrides & Irish Sea	Mangelia Trevilliana, „
Scissurella crispata, Clyde	„ nana, Orkney
Aporrhais pes carbonis, Zetland	Philine quadrata, North Sea

The following are northern species, extending only to the British Channel, or but little to the south of it.

Xylophaga dorsalis	Megathyris cistellula	Natica Montagu
Mya truncata	Chiton ruber	Buccinum undatum
„ arenaria	Lacuna pallidula	„ Humphreysianum
Thracia villosiuscula	„ vineta	„ Dalei
Cochlodesma pretenue	„ crassior	Fusus Islandicus
Tellina pygmaea	Rissoa Zetlandica	„ propinquus
Cyprina Islandica	Skenia planorbis	„ antiquus
Astarte compressa	Scalaria Trevilliana	Mangelia rufa
Modiola modiolus	Aclis nitidissima	„ turricula
Leda caudata	Eulima bilineata	

*Crenella discors*, I have never met with south of the British seas, and suspect that when reported from the south of Europe, it has been confounded with *Crenella marmorata*, and *Crenella costulata*. Philippi's description evidently applies to the former.

The following find their southern limit in the neighbourhood of Vigo.

Mactra solida	Emarginula rosea?	Rissoa cingillus
Pecten tigrinus?	Trochus tumidus	Natica monilifera
Crania anomala	Lacuna puteolus	Velutina laevigata
Chiton asellus	Rissoa vitrea	Purpura lapillus
„ cancellatus	„ striata	

*Littorina littoralis*, and *Littorina rudis* are met with in Lisbon.

I refer to lists already given for northern species, which are to be found in the Mediterranean, and the Canaries, most of which probably do not extend far to the south of these districts. *Ceratisolen legumen*, *Venus striatula*, *Patella pellucida*, *Acmaea virginea*, and *Trochus cinerarius*? appear to reach their extreme southward limit about Mogador.

Proceeding from the south northward, we find the following species

of tropical type to be recorded from the Canary Islands, but not to have been met with in a more northern locality :—

<i>Crassatella divaricata</i>	<i>Ranella lævigata</i>	<i>Cymba proboscidalis</i>
<i>Cardium costulatum</i>	<i>Cassis flammea</i>	<i>Conus betulinus</i>
<i>Lacina Adansonii</i>	„ <i>testiculus</i>	„ <i>Promethens</i>
<i>Cerithium nodulosum</i>	<i>Cymba Neptuni</i>	„ <i>Guinaicus</i>
<i>Murex saxatilis</i>	„ <i>porcina</i>	„ <i>papilionaceus</i>

*Marginella glabella* and a few other species, probably belonging to tropical Africa, reach as far north as Mogador.

The coast from Cadiz to Cape St. Vincent appears to mark the northern limit of various members of the Mediterranean fauna. The following species, inhabitants of the south coast of Spain and Portugal, and of the Atlantic, are not recorded to have been obtained further north than Cape St. Vincent :—

<i>Solecurtus strigillatus</i>	<i>Pectunculus pilosus</i> , or	<i>Natica intricata</i>
<i>Solemya Mediterranea</i>	<i>purpurascens</i>	„ <i>bicallosa</i>
<i>Psammobia costata</i>	<i>Lima scabrella</i>	„ <i>sagra?</i>
<i>Tellina Costæ</i>	<i>Pecten gibbus</i>	<i>Neritina viridis</i>
„ <i>planata</i>	„ <i>pes felis</i>	<i>Sigaretus haliotideus</i>
„ <i>pulchella</i>	„ <i>hyalinus</i>	<i>Cancellaria cancellata</i>
„ <i>punicea</i>	<i>Spondylus goedaropus</i>	„ ———
<i>Scrobicularia Cotardi</i>	<i>Chiton Siculus</i>	<i>Murex trunculus</i>
<i>Ervilia</i> ———	„ <i>Rissoi</i>	„ <i>brandaris</i>
(undescribed)	<i>Siphonaria concinna</i>	„ <i>cristatus</i>
<i>Tapes Beudantii</i>	<i>Dentalium rubescens</i>	<i>Nassa mutabilis</i>
„ <i>florida</i>	<i>Crepidula</i> — the genus	„ <i>neritoides</i>
„ <i>geographica</i>	<i>Fissurella rosea</i>	„ <i>grana</i>
<i>Cytheria Venetiana</i>	<i>Emarginula elongata</i>	„ <i>variabilis</i>
„ ———	<i>Trochus tessellatus</i>	<i>Buccinum minus</i>
<i>Astarte incrassata</i>	„ <i>Richardii</i>	<i>Pollia maculosa</i>
<i>Cardium erinaceum</i>	„ <i>divaricatus</i>	<i>Cassis sulcosa</i>
<i>Cardita</i> , all the species	„ <i>articulatus</i>	<i>Fusus pulchellus</i>
<i>Ungulina</i> ———	„ <i>Viellotti</i>	„ <i>rostratus</i>
<i>Kellia corbuloides</i>	<i>Trochus fragaroides</i>	„ <i>corneus</i>
„ <i>complanata</i>	„ <i>fanulum</i>	<i>Ranella gigantea</i>
<i>Chama gryphoides</i>	„ <i>canalyculatus</i>	<i>Columbella rustica</i>
<i>Mytilus Afer</i>	<i>Rissoa acuta</i>	„ <i>corniculata</i>
„ <i>minimus</i>	„ <i>Bruguieri</i>	<i>Mangelia reticulata</i>
<i>Modiola vestita</i>	<i>Mesalia sulcata</i>	„ <i>Vauquelini</i>
„ <i>petagneæ</i>	„ <i>striata</i>	„ <i>crispata</i>
<i>Lithodomus dactylus</i>	<i>Cerithium vulgatum</i>	<i>Mitra ebeneus</i>
<i>Leda emarginata</i>	„ <i>fuscatum</i>	„ <i>columbellaria</i>
„ <i>striata</i>	<i>Scalaria pseudoscalaris</i>	<i>Marginella clandestina</i>
<i>Area antiquata</i>	„ <i>crenata</i>	„ <i>miliacea</i>
„ <i>barbata</i>	<i>Vermetus</i> , all the species	<i>Cypræa pyrum</i>
„ <i>Noë</i>	<i>Natica Guillemini</i>	„ <i>pulex</i>
„ ———	„ <i>macilenta</i>	„ <i>moneta</i>
		<i>Conus Mediterraneus</i>

*Cymba melo*, *Pecten polymorphus*, and *Panopæa Aldebrandi*, are met with as far as the neighbourhood of Lisbon. The fine *Chiton rufus*, the largest European representative of the genus, I have only obtained in Lisbon and Vigo, and am not aware of its being recorded from any other locality.

The following species range from the southward to the coasts of Galicia and Asturias :—

<i>Tellina serrata</i>	<i>Dentalium dentalis</i>	<i>Turritella tricostralis</i>
<i>Mesodesma donacilla</i>	<i>Fissurella gibba</i>	<i>Fusus contrarius</i>
<i>Lutraria rugosa</i>	<i>Trochus Laugier</i>	<i>Murex Edwardsii</i>
<i>Cardium papillosum</i>	" ———	<i>Purpura hœmastoma</i>
" ciliare	" ———	<i>Nassa trifasciata</i>
<i>Lucina digitalis</i>	" ———	<i>Cassis saburon ?</i>
" pecten	<i>Solarium luteum</i>	<i>Triton nodiferum</i>
<i>Kellia ?</i> — (genus uncertain)	" straminium	" corrugatum
<i>Mytilus Galloprovincialis</i>	<i>Littorina tigrina</i>	<i>Pleurotoma elegans</i>
<i>Lithodomus caudigerus</i>	<i>Rissoa purpurea</i>	<i>Ringuicula auriculata</i>
<i>Chiton cajetanus</i>	<i>Turbo rugosus</i>	<i>Aplysia Patersoni</i>

Of the following species, the most northern known habitat is the south of Great Britain and the coasts of Ireland :—

<i>Pholas parva</i>	<i>Cytheria chione</i> , (Carnarvonshire)	<i>Haliotis tuberculata</i>
<i>Gastrochœna modiolina</i>	<i>Venus verrucosa</i> "	<i>Trochus exiguus</i>
<i>Petricola lithophaga</i>	<i>Cardium aculeatum</i>	" striatus
<i>Venerupis irus</i>	" rusticum	<i>Adeorbis subcarinatus</i>
<i>Pandora rostrata</i> (Channel Islands)	<i>Lucina divaricata</i>	<i>Rissoa lactea</i>
<i>Diodonta fragilis</i> (Carnarvonshire)	<i>Diplodonta rotundata</i>	" striatula
<i>Syndosmya tenuis</i>	<i>Galeomma Turtoni</i>	<i>Scalaria clathratula</i>
<i>Donax politus</i>	<i>Modiola barbata</i>	<i>Chemnitzia scalaris</i>
<i>Ervilia castanea</i>	<i>Crenella costulata</i>	" fenestrata
<i>Maetra helvacea</i>	" rhombea	<i>Truncatella Montagui</i>
<i>Lutraria oblonga</i>	<i>Avicula Tarentina</i>	<i>Murex corallinus</i>
<i>Tapes decussata</i> (Carnarvonshire)	<i>Calyptrœa Sinensis</i> (Milford)	<i>Lachesis minima</i>
	<i>Emarginula rosea</i>	<i>Nassa pygmaea</i>
		<i>Mangelia gracilis</i> (Clyde)
		<i>Ovula patula</i>

It is a fact to be noted, as probably bearing some relation to an ancient distribution of land, that the range of many species of mollusca, in proceeding northward, takes a curve to the west. Several inhabitants of the Mediterranean, such as *Tellina balaustina*, *Circe minima*, *Psammobia costulata*, *Neera* all the species, *Mangelia Lefroyii*, *Marginella levis*, &c., touching upon the extremity of Cornwall, and extending round the west of Ireland to the Hebrides, although absent from the Channels and the north sea; also a few species being found common to

the coast of West Africa, the Canary, Madeira, and Azore Islands, which are not to be obtained in Morocco or the south of the European continent.

In treating of the distribution of mollusca, some notice should be taken of species which are considered to be local, that is, limited to a particular locality or a small area, though the number of these is constantly diminishing as we extend our knowledge.

A newly-discovered species is supposed to be confined to the spot where it was first obtained, until it re-appears in a locality where it was perhaps least expected to be met with ; this more particularly happens with some of the deep water species. Many marine shells supposed to be peculiar to the Canary Islands are probably common to a large unexplored tract of the African coast—several of them I have found in Madeira.

The interesting shell *Pleurotoma*, or *Mangelia teres*, was first discovered by Professor E. Forbes on the coast of Lycia ; it was next met with, a few years afterwards, in the Channel of the Minch, between the Isle of Skye and the outer Hebrides, and has since been procured pretty generally throughout the British seas. I have obtained it in various parts of the Mediterranean, in the Canary and Madeira Islands, and it is in Loven's enumeration of the shells of Scandinavia. *Crenella rhombea*, one of the rarest species of our seas, having been only found in three or four instances and one locality (off Weymouth), I have met with in the Bay of Gibraltar, Gulf of Tunis, and abundantly off Lancerote, one of the Canary Islands. *Chemnitzia fenestrata*, discovered only six years ago in Dartmouth harbour, has since been obtained from at least two other localities in the South of England ; I have procured it in Vigor bay, and it has been found in the result of dredgings from Alexandria in Egypt. It would be easy to cite many similar instances, but what I have mentioned may suffice to prove how unsafe it is to conclude that a species is restricted to a peculiar locality, from the negative fact of its not having been found elsewhere.

For my part, I believe that very few, if any, marine species are confined to very small areas. With reference to the curious mollusk *Bifrontia zanclea*, which was only known as a very rare fossil obtained at Messina, and no recent example even of the genus recorded to have been seen, but which I found living in considerable abundance at Madeira, it is probable that further researches will discover its existence in other parts of the Atlantic ; if not, it will appear to be an exception, and that its present habitat is its last refuge and stronghold, after becoming elsewhere extinct.

As has been already shown, the Islands of the Canaries, Madeiras, and the Azores possess a marine fauna closely allied to that of the old continent, notwithstanding that the prevailing set of the currents is from America. Very few mollusca are common to both sides of the Atlantic, except such as are inhabitants of the Arctic Seas, and extend along the coasts radiating from that centre. Out of about 160 species of shells of the Canary Islands and Mediterranean, of which I sent specimens to the late Professor C. B. Adams, he informed me that he could only identify one (*Columbella cribraria*) with a West Indian species—he had probably overlooked *Neritina viridis*, and perhaps one or two others.

*Saxicava arctica* appears to be the most cosmopolitan of mollusks; belonging, as its specific name imports, to the Arctic Seas, but able to accommodate itself to a variety of climate, and to all zones of depth, as far as about a hundred fathoms; it has been brought from Spitzbergen, China, Behrings Straits, California, and Australia. This, with perhaps a few others, forms an exception to a general law which appears to limit the range of species in animals of this class.

The distribution of mollusca depending partly on the nature of the sea bottom, and on other conditions difficult of appreciation, is liable to great intervals of space. *Neara costellata*, inhabiting the Mediterranean, Canaries, Madeira, and Norway, has only been met with at one point (Loch Fyne) between the first and last-mentioned localities, or in about 20 degrees of latitude, and there are other species which present parallel circumstances.

Before concluding, I may be allowed to make a few remarks on the distribution of Land Mollusca, which must, it is evident, be affected by many conditions, different from those which influence the spreading of their marine relatives.

We find among snails and allied genera an astonishing variety of habit. Some affect moist situations and dense forests never penetrated by the rays of the sun, feeding voraciously upon a rank vegetation; while others prefer the most arid tracts, where their food must be scanty and deficient in succulence; some, like *Bulimus decollatus*, pass most of their time buried in the earth; while others, "through winter's cold and summer's parching heat," select exposed situations, and are enabled to retain their vital powers through extreme changes of temperature. Of these our little *Helix umbilicata* and *Helix pisana* may be quoted as examples. Most species seek shelter in the crevices of rocks, and under stones.

Although many terrestrial mollusca are capable of enduring not only extremes of heat and cold, but of existing for an astonishing long period

without food, (properties which, as admirably adapting them for a sea stock upon long voyages, are extensively taken advantage of for that purpose by sailors of the south of Europe; and I may here remark, that as an article of food, the mollusca, with very few exceptions, have been too much neglected by ourselves, and that snails are not only wholesome and nutritious, but even, where prejudices do not interfere, esteemed a delicacy, not to mention that their being in request for culinary purposes would be the means of relieving our gardens from their inroads); notwithstanding, I say, their powers of endurance, they appear to be particular in the selection of locality. The arctic climate and productions are evidently not suited to snailish and sluggish habits and tastes. Even in the colder temperate regions species are few, but increase in numbers as we proceed southward, and they are found particularly to abound in limestone formations.

It is a most remarkable fact connected with the distribution of land shells, that some species are extended over very wide districts, while others are restricted to an area of a few square miles, or even less. Great Britain does not offer for observation a single species which is not likewise an inhabitant of France or Germany, though the neighbouring countries of the continent possess some which are not to be met with in this kingdom; and while thus among the hundreds of islands of Great Britain not one produces a species peculiar to itself, in the groups of the Canaries, Madeiras, and Azores, each island presents some species supposed to be strictly local.

This fact is particularly striking in the Madeiras—where Madeira proper contains but few species, while the small island of Porto Santo supplies an astonishing number, in general specifically distinct from those of Madeira, and the rocky islets called the Desertas, with difficulty accessible by man, have each some peculiar forms and in great abundance.

These facts seem to indicate that Great Britain and Ireland, including the Hebrides, Orkney, Zetland Islands, &c., have at one time formed part of the European continent, but that the more distant islands which I have named—raised by volcanic action from the depths of the Atlantic, have been each the scene of the creation of certain species which have been confined within their narrow limits by the surrounding sea.

Opposed to this idea is the fact already alluded to, that some marine littoral species, I may particularly mention *Littorina striata*, are common to West Africa, the Canaries, Madeira, and the Azores, which (as it is quite impossible for littoral phytophagous animals to have travelled

along the bottom of the ocean,) would lead us to infer that the African continent had at one time extended as far west as the last-named islands, in accordance with an opinion very ably supported by Professor Edward Forbes, in his report on the connexion between the distribution of the existing Fauna and Flora of the British Isles, published in the memoirs of the Geographical Survey of Great Britain. Which of these theories is correct, or whether they can both, with some modification, be reconciled to each other, I must leave for geologists to determine. The only solution which suggests itself to me is, that the shores of the African continent may have extended as far west as the islands in question, and that immediately on the subsidence of the land, when it was barely submerged, and the conditions not yet incompatible with the existence of littoral species of marine Mollusca, the volcanic action took place, elevating the lofty masses of which most of these islands are composed, and that their peculiar land mollusca are of more recent origin.

Such an explanation would, I believe, be consistent with established geological facts, but I merely suggest it for the consideration of those who are more qualified than I can pretend to be to grapple with the vast subject of the history and conditions of our planet, in times anterior to the present distribution of land and water.

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### THIRD MEETING.

ROYAL INSTITUTION.—November 14, 1853.

JOSEPH DICKINSON, M.D., F.L.S., &c., PRESIDENT, in the Chair.

At an EXTRAORDINARY MEETING, held previous to the Ordinary Meeting, the following resolution, passed at the last Extraordinary Meeting, was read and confirmed, viz.—“That the Subscription, payable by Ordinary Members, be increased to £1 1s. 0d. for the present session.”

It was moved by Mr. JOHN FORSHAW, and seconded by the Rev. Dr. HUME: “That this Society appoint five members of Council, viz.—The Treasurer and Secretary, Mr. J. P. G. SMITH, Dr. W. IHNE, and

Mr. JOHN HARTNUP, as representatives to deliberate with the representatives of the Polytechnic, Architectural and Archæological, and Historic Societies, on the subject of the proposed union of the Societies, and report thereon."

An Amendment was moved by Mr. C. F. SALT, and seconded by Dr. INMAN: "That this Society has reason to be satisfied with its present condition and future prospects, and therefore respectfully declines the application to appoint five delegates to meet others to report on a proposed union."

The Amendment having been put and negatived, the original motion was carried.

It was moved by the Rev. Dr. HUME, seconded by Dr. INMAN, and carried unanimously: "That it be a recommendation to the Council to publish annually, and not at longer intervals, such account of the proceedings, and such papers, or abstracts of them, as the Council may think right, and the funds warrant."

Mr. HENRY GREENWOOD, and W. H. PEARSE, M.D., were ballotted for, and duly elected Ordinary Members.

The Rev. Dr. HUME exhibited some curious manuscripts, denominated the Ireland Manuscripts, relating to the Liverpool Election of 1670.

Mr. TOWSON, in the absence of Mr. HARTNUP, mentioned some interesting facts relating to the planet recently discovered by Mr. HIND. This was the ninth discovered by him since he had adopted his systematic method of examining the heavens; and the total number of planets known to exist between Mars and Jupiter is now increased to twenty-seven. It is a most extraordinary fact, that the last discovered is the brightest of the small planets, and could be observed in the finder of the Liverpool telescope. It was observed by Mr. HARTNUP, on the 10th, 11th, and 12th, of the present month, and its character fully established.

Mr. T. P. MARRAT exhibited a new mineral, called *Cornistanite*. Its appearance under the blow-pipe was similar to that of Borax, as was also its smell. It did not melt, but was very luminous, like lime or magnesia.

Mr. HENRY COX exhibited an earth worm, which was phosphorescent. He was requested to make further observations on the subject, and endeavour to furnish such information to the Society as would enable them to determine the origin and character of the animal.

Mr. JOSEPH BOULT read a paper, of which the following is an abstract



## THE MOST MARKED DEVELOPMENT OF THE ARTS PROMOTED BY WAR.

The alternations of public opinion are aptly compared to the oscillations of a pendulum; usually more or less in extremes, it seldom passes through, and never abides in, that *juste milieu* known to mechanics as the centre of motion. Therefore, as each subject is brought under notice, it must be seen from many positions ere that is attained from which only the correct view can be taken. Whatever be the subject, a more or less extreme opinion is formed of its merits; and, according to the bias of the observer, every fact, or apparent fact, is eagerly enlisted in support of the opinion he upholds.

In all states of society the majority will be dissatisfied with things as they are, and desirous of change, in the hope of obtaining more success in the several pursuits. Many reconcile themselves to the want of success, as far as that reconciliation may be effected, by assuming that in different circumstances they would have that scope which is now denied them. In times of peace such persons are ready to welcome war, as giving an entire change to the routine of operations; in war time they clamour for peace, from a similar motive.

It was, therefore, extremely natural, during the lengthened continuance of the late European war, that public opinion should incline to peace; an inclination which was no doubt strengthened by the heavy taxation and debt which now form part of its monumental record in this country. At the commencement of that war, and for many years of its progress, public opinion was decidedly in its favour, and prepared to uphold it at any cost; but the cost reached an almost fabulous amount, and a reaction ensued. The centre of motion was approached, and it was passed; though, happily, not before that war was honourably concluded. Since the peace, the pacific oscillation has gradually ascended higher and higher, until the utmost extreme of literal non-intervention is almost attained. The experience of school-life is ignored, and men who, when boys, withstood the tyrant of the play-ground, and protected his feeble victim from oppression, have now outgrown such weak generosity, and wish their country to look on, a dispassionate witness of similar cowardly aggression. Meanwhile, the most extreme statements, in favour of what are called the peace doctrines, are frequently hazarded, and *ad captandum* addresses upon the blessings of peace published.

Amongst the most favoured and frequently reiterated opinions, are the intimate and mutually advantageous relations subsisting between

peace and commerce; and the exclusively favourable influence which peace and commerce exercise, not only upon the arts of industry, but also upon literature and the fine arts.

This opinion appears premature. It is high in favour with the advocates of peace at all times, and by all means; but I do not think that history affords any record when peace and commerce, in conjunction, and exclusively of war, have exercised the beneficial influence ascribed to them. When commerce has been a party to the patronage of literature, and of the fine arts and sciences, she has generally done so in conjunction with, or under the influence of war. Drawing conclusions from the data furnished by past experience, it is more correct to say that most of the progress effected in those departments of study has been promoted, directly or indirectly, by war. This may appear a broad and startling assertion in the present state of public opinion in this country; but it may be not the less true, as there seems to be an unduly pacific bias in the received opinion.

After alluding to the stormy times which preceded the age of Pericles, and prevailed during the earlier portion of his career, when he was a successful general, the author gave the following quotation: "From the age of Pericles to the time of Alexander the Great, Athens, though almost constantly engaged in wars, had not neglected those arts which have associated her name with civilization. Her public buildings were continually increasing in number and magnificence, which was mainly due to Lycurgus the orator, who built the Panathenaic stadium, and provided for the security of the city by the magazines in the Acropolis, and by the dockyards in the Peiræus." He then remarked—Look now to the glorious galaxy of illustrious names with which this period of history is gemmed; a period, be it remembered, of intestine feuds foreign invasions, "thirty tyrants," and sparse breathing times of peace. There are Anaxagoras, Socrates, and Plato, in philosophy; Xenophon the historian; Æschines and Nicias in the fine arts. Where these more abstract pursuits, which are unnecessary to the ordinary routine of material existence, were so studied and adorned, we may be sure that the useful arts were not neglected; and that in the magazines on the Acropolis, the dockyards of the Peiræus, and the wooden walls of Athens was evidence of the practical ability of the Athenian mechanic. The buildings that remain testify to this—the works that are gone have no doubt carried away much testimony to the same effect; but it will be observed that with the exception of the thirty years' truce, in the time of Pericles, the normal condition of Athens, during its most civilized period, was that of war in one shape or another; and that

it was success in war that ministered to the triumph of the peaceful arts.

The author enforced his views by reference to the Augustan age in Rome ; to the Italian republics ; to the eras of Elizabeth and Anne, in this country ; and to the period of the American and Napoleonic wars ; observing of the latter—Notwithstanding their alleged crippling influence on the commerce of this country, see that commerce diffusing itself all over the globe, and bringing the more important products of every clime to our island home. See, while strife raged abroad, the gigantic improvements introduced into the arts and manufactures ; all the improvements in the machinery for spinning which have given fame or wealth to Arkwright, Strutt, Cartwright, and Peel ; the adaptation of steam to mining and manufacturing purposes by Watt ; the application of coal gas to artificial illumination, by Murdoch, Winsor, and Clegg ; the formation of canals by Brindley and the Duke of Bridgewater ; the foundation of the Royal Academy of Arts ; the extension and improvement of periodical literature ; this is all so recent, you do not require to have your memory refreshed with particulars, nor need I enumerate more of the names of those who participated in these great works.

After referring to the corroborative evidence afforded by the Egyptian and Assyrian remains, and commenting upon the general deductions to be drawn from the examples quoted by history, he observed—Nor let it be hastily supposed that the rapid advance recorded as having been made during the peaceful rule of Pericles or Augustus, was due entirely to that peace. What is called the peace of Europe has subsisted beyond the duration of that of Pericles ; yet, in commercial England, with all the superior advantages we boast, we may look in vain for any adequate rivalry of Athens or of Rome. The attainment of excellence in any human pursuit of value is not to be compared to Minerva's birth ; it is the slow growth of years, sometimes of generations. The consummate skill and grace, therefore, displayed by Phidias and his contemporaries, had been gradually matured through all the distractions of the Persian invasions and the preceding wars with Sparta and other states. The siege and ruin of the older Athens prepared a stage on which the excellence attained might be displayed. The inferior productions of the period of pupilage were swept away, and there was no impediment to the free scope of the master mind ; just as the prairie-fire destroys the withered remnants of an exhausted season, from whose ashes spring fresher and more luxuriant manifestations of productive energy.

The muleteer's path may, indeed, rudely sketch the general outline of the invader's course; but who can deny that after Hannibal or Napoleon had constructed the broad military road for the passage of his troops, the intercourse, commercial and otherwise, along that route was greatly increased? So in the Highlands of Scotland, the rude and warlike people who inhabited those glens and fastnesses were inaccessible to the softening influence of civilization and of commerce, until Marshal Wade constructed his military roads through all their strongholds, and freed them from the contracting and jealous influence of isolation. "Had you seen these roads before they were made, you would hold up your hand, and bless General Wade." It is well known that the Romans also consolidated their conquests by the construction of magnificent military roads.

The muleteer—usually a *contrabandiste*, waging petty and personal warfare against the fiscal regulations of nations—pioneers the course of some great and successful warrior, in whose train the peaceful arts follow in triumphant security, ministering to his glory who prepared so spacious and safe a channel for the flow of their civilizing influence; and commerce herself eagerly treads the same path, doing homage to the grandeur of the warrior's achievement.

He then proceeded to review the opposite or commercial view of the question, observing—That commerce is essentially narrow-minded and soul-contracting in its influence; its vital principle is the love of gain; its rule of conduct self interest, not always "enlightened." It has been said of its devotees, that they are so engrossed in making friends of the mammon of unrighteousness, they have no leisure to attend to the other precepts of the gospel. It is manifest, then, that it is not accordant with the genius of commerce to encourage any arts or pursuits but those that minister to the love of gain. Essentially utilitarian in its nature, commerce has no imagination to gratify; inherently selfish, it has no noble deeds to record, no sympathy to crave or give; its most extended range of thought begins and ends in self.

If we search for the immediately exciting cause of national excellence in the fine arts, it is found to be religion or war, two of the most powerful agents to which men can be exposed, and both influencing the affections: the one swaying the mind through fear or love, the other through the love of glory, which, unlike the love of gain, requires sympathy for its perfect gratification. Hence the attachment of warlike nations to the fine arts, which are essentially dependent on sympathy for their perfect appreciation. Religion, particularly as theology, has not unfrequently incited nations to war, either from a sincere belief that the war was

necessary, or from a courtly, and not unusual, compliance with the prevalent vice or folly of the age. Under Paganism, Mahommedanism, and Christianity, wars and persecutions have flourished. When warriors have achieved success, then ministers of religion have vied with bards in pæans for the conqueror; they have swelled his triumph and ministered to his glory; and, in order to make their efforts more complete, they have enlisted the fine arts to their aid. Acting thus in conjunction, the influence of religion and war has been unrivalled, and the successful prosecution of the arts of peace, by any nation, has usually depended on these influences, conjoint or separate: it was so in Egypt and Assyria, in Athens and in Rome. The merchant prince of Italy warring with territorial potentates; the grandee of Spain fighting with the Moslem; the burgher of Ghent waging war with his suzerain or the invader, the fugitives who founded Venice, and they who fled to the marshes of Holland; these, and their descendants, with the spoils of war, or the fruits of agriculture, manufactures, and commerce, under the stimulus of a warlike era, enlarged and adorned their cities, indulged in luxurious palaces, paid tribute to religion, and commemorated their departed heroes. The rudest nations manifest their dawning love for art by decorating the weapons and person of the warrior chief. The most acceptable ornament of religious edifices has been the spoils of war, either as taken from the field of battle and hung up for trophies, or transmuted by affection and piety into decorative memorials of departed heroism, uttering through long years, to succeeding generations, the touching appeal, "Pray for his soul!"

But where a nation has been permitted to enjoy a long period of commercial prosperity, undisturbed by war of any kind, its encouragement of the fine arts, more especially, has been stinted and illiberal. I am not aware that those carriers of antiquity, the Phœnicians, have left any records of profuse patronage behind them; and certainly the two most commercial people of modern times have been singularly remiss; neither England nor America is noted for its encouragement of the fine arts. America, which has been less occupied by war, it might be expected would have earned a profusion of bays, had the highways of successful commerce been the highways of the peaceful arts. England has exerted most of her patronage during her periods of war; from the time of Alfred the Great to the peace of 1815, the eras of her poets, historians, and artists of every kind are coincident with her most warlike and successful monarchs. On the other hand, Mr. Fergusson, and other writers on India, inform us that whilst each of the other numerous dynasties who have conquered that

country has recorded its predominance in great works of public utility, such as improvements in irrigation, or in temples and palaces, the commercial government of commercial England has hitherto prepared no such records; and were her authority to be overthrown to-morrow, future antiquaries may search in vain for any memorial of her sway, other than traditions of the salt monopoly, that metempsychosis of the odious *gabelle*. Here, then, is a country in which numerous warlike nations hold successive sway, and are followed by a race of merchant princes. The warriors, each in turn, endeavour to develop the material resources of the country they have subdued, or to record their wealth and power. The merchant princes, under the influence of an unmitigated commercial spirit, grind from their conquest every advantage personal to themselves, and, until recently, have felt no compulsion to benefit the source of their own wealth and power by any reproductive works; and have deferred their patronage of the fine arts, whatever that may be, until they return home.

Then look at England's public monuments in St. Paul's and Westminster Abbey; exclude the warriors and the statesmen, and how many remain? Look at this town of Liverpool, the greatest commercial emporium of the country, and who are the men its people have delighted to honour? Of twenty-five docks, nine testify loyal attachment to the reigning family; they are the Clarence, Victoria, Prince's, George's, Albert, King's, Queen's, Coburg, and Brunswick; three commemorate former representatives in parliament, two of whom happened to be statesmen of eminence, they are the Canning, Huskisson, and Sandon docks; four have names of purely local signification, they are the Salthouse, Union, Harrington, and Toxteth docks; three are said to be grateful acknowledgments of services from peers and local landowners, they are the Egerton, Stanley, and Salisbury docks; one, the Bramley-Moore dock, is a token of respect to a late chairman of the trust; and the names of the remainder, five in number, are the tribute paid by commerce to successful war; they are the Waterloo, the Trafalgar, the Wellington, the Nelson, and the Collingwood docks; not one commemorating a man of science or literature, a philanthropist, nor even maritime discoverer.

There are five public specimens of the sculptor's art in Liverpool; they are George III., Huskisson, Canning, Roscoe, and Nelson: one sovereign, three parliamentary representatives, and a naval hero. It does not appear to be the nature of commerce to be grateful to her own heroes. Columbus may be sufficiently noted in the pages of history, though another name than his has been bestowed upon the new world,

which has yielded so much wealth to Liverpool ; but had he, or Drake, Raleigh, Frobisher, or Cooke, been as distinguished in the annals of war, as they are in those of commerce, it may safely be presumed, that some town, or people, would have done honour to themselves by a grateful acknowledgment of the benefits derived from such daring enterprize. The ruling principle of commerce—the love of gain—of course ignores all such gratuitous appreciation of the services conferred upon her.

Turning from the past, is there no hope that in the future commerce may be more propitious to the arts than the records shew that she has been ? Faint traces of a change may, I think, be discerned. It must be remembered, that, with the exception of the department of electricity, most of the mechanical improvements of the day, by which commerce is more directly benefitted, are but refinements upon inventions and machines originated during the war. The locomotives on railways, for example, were originally introduced by Trevithick, on a coal tram in South Wales, as far back as 1808. But I would fain hope that we may discern a growing desire to nurture a more kindly interest between the several classes of the community ; to render less rigid and impassable the icy barriers that divide the employed and the employer, that they may cease to regard each other merely as instruments of personal advantage ; and to unite all in bonds of friendship and good feeling. Now the peaceful arts, especially the fine arts, depend for their perfect development upon active sympathy ; and it cannot be doubted that had more enlightened views prevailed, much greater progress in the arts would now be obtained. But commercial men have applied too often the test of pecuniary return ; to have been betrayed into the unguarded patronage of objects which fill no line on the credit folio. The advancement of knowledge, the improvement of mankind, the encouragement of fine arts and poetry, or the study of abstract science, have usually been alien to the genius of commerce.

The suggestions of science have only been deemed worthy of adoption when they facilitate the acquisition of wealth, or the economy of expense. Frequently advantages of either kind have been neglected through ignorance : the test of pecuniary return having been applied to education, and occasioned a very imperfect acquisition of knowledge. There now appears to be a growing suspicion that the hitherto prevailing test is not altogether infallible ; that there is much of value to which it cannot be applied ; and that intellectual study and consideration for others should have their portion in every man's life, in order that he may worthily act his part as a citizen, without reference to higher

and more enduring relations. As the intellect and sympathies are allowed freer action, the sordid influence of commerce will be counteracted and refined; and knowledge and philanthropy, aiding genius, may civilize the world.

Very different has it been in times past! Very different is it now! The hardworking, toiling inventor, the ore of whose unmaturing conception is rich with benefit to present and future generations, whose earnest study of his one idea has grown almost into a monomania with the unrequited toil of twenty years, how often must he faint in his iron task! how often require the kindly word and look, or the substantial assistance of enlightened and sympathising capitalists!

And he, perhaps, of finer mould, rich in the great gifts of imagination and study, who links in harmonious verse the noblest deeds or highest aspirations of our race, — or his brother poet, who, on canvas or in marble, gives shape to the poet's dream, and records the hero's achievement,—how often do these tire and faint in the turmoil of life's fierce fight, and sigh for the sustaining hand, or friendly glance, that shall nerve them to continued conflict! nay, how often are they utterly cast down and forsaken, because the unheeding votaries of commerce, wanting in the finer sensibilities, crushed out of them by ceaseless efforts to make a living or amass wealth, cannot understand the works submitted to their patronage, and "pass by on the other side!"

No! beautiful and attractive as is the dream that peace and successful commerce minister to the triumph of the peaceful arts, the most eloquent attempts to support such a conclusion from history will only half persuade, so long as the "merchant princes" of the "living present" give no general indication that their hearts are stirred within them by the graces of poetry and art; nor evidence the humanizing influence of commerce by grateful commemoration of those enterprising heroes "with souls thrice bound in brass," who dared so many dangers, endured so much hardship, and opened so many highways for the peaceful arts. Let us not have to wait until all those highways are profaned, even more than they are, by the tread of hideous war; let us not have to wait until they are paved with the slaughtered dead, nor until some other bloodstained, but magnanimous conqueror, shall again show that in the train of successful war is the triumph of the peaceful arts!



## FOURTH MEETING.

ROYAL INSTITUTION, November 28, 1853.

J. B. YATES, Esq., F.S.A., VICE-PRESIDENT, in the chair

Mr. THOMAS CROXON ARCHER was ballotted for, and duly elected Ordinary Member.

Mr. J. B. YATES read extracts from a paper, on the "Palatine Jurisdiction of the City of Chester," with a Memorial of the Life Character of Edward, third Earl of Derby.

Mr. J. T. Towson read the first part of a paper on "Great Circle Sailing."

## FIFTH MEETING.

ROYAL INSTITUTION.—December 12, 1853.

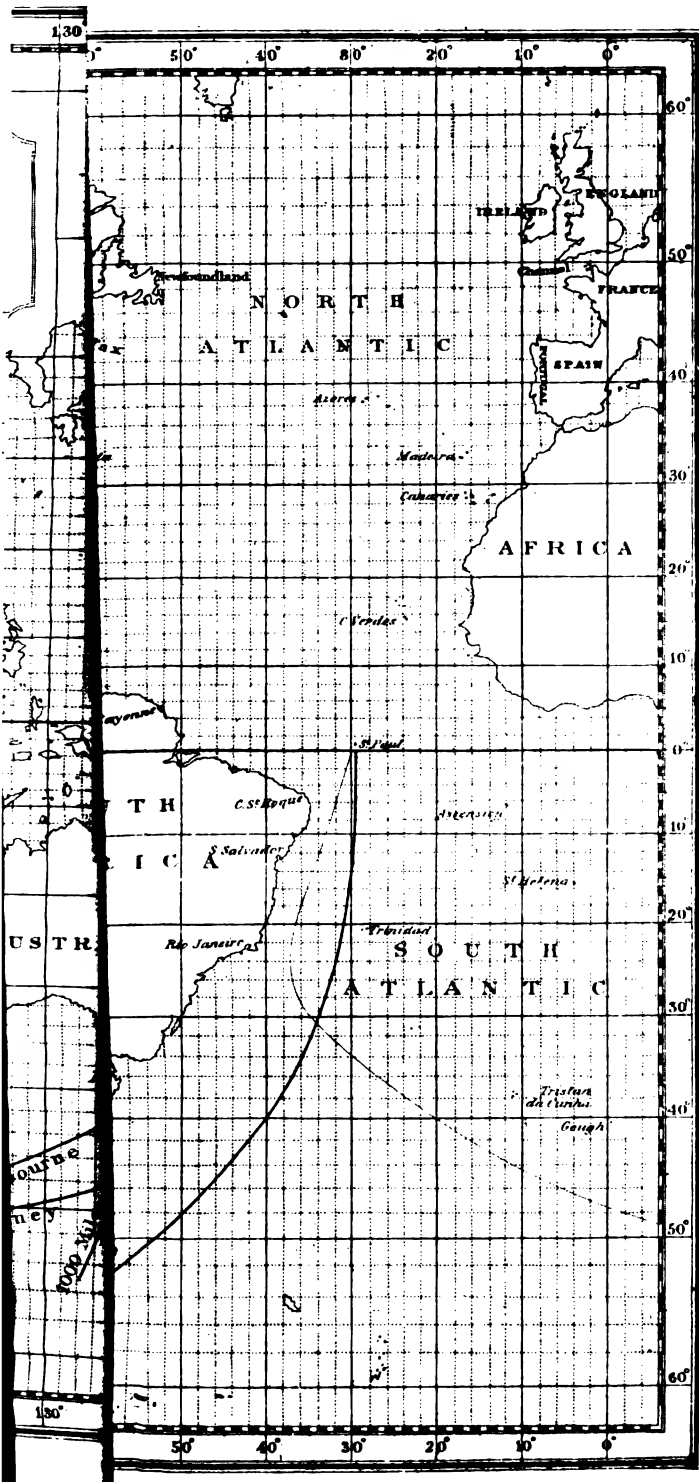
J. B. YATES, Esq., F.S.A., VICE-PRESIDENT, in the Chair.

The Rev. JAMES PORTER, B.A., Mr. THOMAS McNICHOLL, Mr. JOSEPH GODDEN, and Mr. JOHN KEATES, were ballotted for, and duly elected Ordinary Members.

Mr. J. T. Towson concluded his paper on

## GREAT CIRCLE SAILING.

GREAT CIRCLE SAILING is the art of navigating a ship by the shortest possible route. A straight line is absolutely the shortest track between any two points; but a straight line cannot be projected on the surface of a globe. It must either touch it at one point, passing off from the surface as a tangent; or, if two points on such a surface be united by a straight line, it must be effected by tunnelling below the surface; the straight line in this last case being the chord of the arc between the two points. Since then we cannot sail over the surface of the ocean in a straight line, let us inquire what route is practicable, which differs less than any other from a straight line. This we shall find to be what we denominate the arc of a great circle. If we slightly bend a straight rod





into a circular form, we shall find it to be the arc of a large circle. If we bend it more into the form of an arc, we find that it becomes the part of a smaller circle, and the more we bend it into a circular form, the smaller will be the radius of the circle with which it will correspond. Thus we find that the larger circle deviates less from a straight line than the arc of any of smaller radius; so that, if the mariner sails over the ocean by the route of an arc of the largest circle that can be drawn on the surface of the globe, he may be said to sail directly to this port. We may draw an unlimited number of circles on the surface of a globe, each varying in its diameter; but we cannot draw a circle on such a surface, the radius of which is greater than that of the globe; the arc of a circle, the radius of which is equal to that of the globe, is what we call the arc of a great circle. The arc of any larger circle than that of a great circle, will, as is the case with a straight line, be a tangent to the globe, touching at one point only. A great circle may also be distinguished from any other circle drawn on the surface of a globe by its dividing the surface into two equal parts; thus, the equator is a great circle, dividing the surface of the earth into two equal areas, called the northern and southern hemispheres. But the tropics are not great circles, and we consequently find that each divides the earth into unequal parts. Thus, north of the Tropic of Cancer we have  $66\frac{1}{4}^{\circ}$  of latitude, whilst south there are  $113\frac{1}{4}^{\circ}$ . On the north of the Tropic of Cancer we have a temperate and a frigid zone; on the south we have three zones—a temperate, a frigid, and a torrid zone. There is also a practical method of determining whether any arc on the surface of a globe be the arc of a great circle. If we hold a piece of string tightly by its ends, and press it down on the surface of the globe, it will describe the arc of a great circle; and this method of projecting the arc of a great circle at once, is also a proof that a great circle is the shortest possible track over the surface of a globe. The carpenter draws his straight line on a plane by a chalk-line. The principle is this—he employs a tension which draws the line as short as the points to which the ends are fastened will allow. Now, since a straight line is the shortest track on a plane, he produces a straight line by this means; but, when we stretch the line over the surface of a sphere, the rotundity of the surface bends the line from a straight into a circular form; but, since it deviates as little as possible from the straight line, it forms the arc of a great circle, such being the shortest track across the surface of a globe. There are, however, other circles connected with the science of navigation, besides great circles. The parallels of latitude are circles lessening in their diameters as we approach either

pole. The parallel of  $48^{\circ}$  of latitude is but two-thirds the diameter of a great circle, and the parallel of  $60^{\circ}$  is only one-half the size ; and it is on these parallels that the mariner steers his ship, when his port is east or west of his ship, if he adopts any other system of navigation than that of great circle sailing. If he sails north or south, he sails on the arc of a great circle, whatever system he employs, because the meridians, or north and south lines, are great circles dividing the earth's surface into equal parts. Also the mariner who sails east or west on the equator, sails on the arc of a great circle, the equator being a great circle ; but, in all other cases the mariner who sails by Mercator's chart takes his ship by a circuitous route. If he does not sail in the direction of one of the cardinal points, he sails on what is technically called a rhumb line ; which on the chart is represented as a straight line, but on the globe is a spiral, making endless revolutions round the poles. Thus Mercator's sailing conducts the ship by a circuitous route, as compared with great circle sailing. It was adopted on account of its simplicity, and not on the supposition that it conducted the vessel by as short a route as great circle sailing did. By Mercator's sailing a ship may be navigated by one course throughout the voyage. For instance, if the ship and her port be both in the latitude of  $50^{\circ}$  north, and the port west of the ship, she could then reach her port by sailing a due west course throughout the voyage. But not so by great circle sailing ; she would then have, if in north latitude, first to steer north of the west, and constantly vary her course to the left, till at length she would reach her port by a south-westerly course. This fact requires explanation ; the ordinary mariner cannot be made to comprehend how it is possible that, by varying his course continually, he will reach his port by a shorter track than by sailing one course all the voyage. It is generally supposed, if the place A be west of B, that B must be east of A. This would be the case if this earth were a plane, but it cannot be so on the surface of the globe. East or west are local or relative terms ; they have no existence in space, but refer only to the locality in which we are situated. If I say that A is west of me, I imply that the position of A is at right angles to the meridian, or north and south line of the place in which I am situate. Now if all the meridians were parallel to each other, then a line at right angles to one would be at right angles to all. And the meridians of all places are represented by parallel lines on the chart ; and so it is that, by referring to the chart, it appears that if A be to the west of B, then B must be the east of A. But on the globe, the meridians, or north and south lines, meet at both poles in angles varying with the latitude and the difference of longitude ; conse-

quently, a direct line which cuts one meridian at any angle cannot cut any other meridian at the same angle. Now, supposing that either of the audience and myself were at equal distance from the North Pole, the pole between us, and in sight of each other, we should then be both north of each other, because each would be situated in the direction in which the North Pole was situated. Thus it must be when the principles of great circle sailing are admitted; but, according to Mercator's principles, we should be east and west of each other, being both on the same parallel, which on the chart is represented as a straight line, running east and west. Then, we find that the great circle course is the direction we see any object—the course the crow flies; it is the real direction of the object, if in sight; it is the direction in which is situate the base of a mountain, when we discern its summit in that position. It is also the position of any place at which a heavenly body is vertical, at the time in which that heavenly body is seen from any other place. For instance, the island of St. Salvador, or Cat Island, has, at a certain hour of the sidereal day, a star, called *Alpha Arietis*, nearly vertical, or overhead. Liverpool has also another star, called *Beta Draconis*, nearly vertical, at a certain time of each sidereal day. Now the position in which we, at these times, see these stars is the real position of the place over which it is vertical at the time. If, then, we sail from Liverpool for St. Salvador, we should see *Alpha Arietis* bearing west; as we proceeded on our voyage, its position with regard to the ship's place would veer round to the south, till at length we reached our port at last by a course S.W. by S. During the whole of this voyage, we should see the vertical star of St. Salvador right before us; and the vertical star of Liverpool right astern; and in returning, by great circle sailing, we should observe the vertical star of Liverpool right a-head, and the vertical star of St. Salvador right astern; so that it is evident that though we were obliged, in adopting great circle sailing, to alter continually our course by compass, still we sailed directly from one port to the other. Not so, however, if we adopted Mercator's sailing. We should then start from Liverpool, with the position of the vertical star of St. Salvador to the right 28°. The difference between the position of our port and our course would daily decrease, until we arrived at our destination. Thus, again, we find that, by Mercator's sailing, we sail one course by compass throughout the voyage; but, by great circle sailing, we constantly vary our course; still it is by great circle sailing we steer directly to our port, while by Mercator's sailing we arrive at our destination by a circuitous route.

It was not from the want of a conviction of the advantages connected with great circle sailing that, till of late, it had been so rarely used by practical men, but from the tedious length and embarrassing nature of calculations requisite to determine the series of ever-changing courses which a vessel must pursue, in order to follow the track of a great circle.

In order to obviate this evil, I invented and computed a set of tables, in 1847, which the British Admiralty did me the honour to publish, by means of which the finding of these courses in succession is reduced to an affair of inspection. By this means I have had the honour of introducing great circle sailing into general use; from which circumstance it has been assumed by some, erroneously, that I have laid claim to the invention of great circle sailing, and this supposed assumption of mine has been apparently confirmed by the fact of my laying claim to the honour of being the originator of composite sailing, which is often denominated great circle sailing, and to which we shall hereafter refer. In order to clear myself from the charge of assuming the honour of being the inventor of great circle sailing, with which I have been frequently taunted, I will read from one of the most extensively-circulated works ("Weale's Rudimentary Treatise") a quotation from a lecture delivered by myself to the Society of Arts:—

"From a communication by Mr. Towson to the Society of Arts, in May, 1850, it appears that, in 1495, Sebastian Cabot projected a voyage across the Atlantic on this principle, with a view to the discovery of a north-west passage to India. In 1537, in the first treatise on Navigation, the system was treated of by Nunez. In 1561, Cortez, and after him Coignet and Zamaramo, advocated the adoption of great circle sailing."

From these observations it will be evident that I am not chargeable with the desire to claim the unmerited honour of being the inventor of great circle sailing.

Before we advance further in the investigation of the subject, it will be necessary to make a few remarks on the nature of Mercator's sailing. In order that the sphere should be drawn on a plane, it is necessary to distort the surface. Those regions towards the pole have to be distended for this purpose. In thus distorting the earth's surface, the shortest route is made to appear as circuitous; and the circuitous route, by a parallel of latitude, is represented by a straight line. If two places do not differ in longitude more than 30 or 40 degrees, the error of Mercator's chart is not very perceptible. In crossing the Atlantic, it differs from the great circle route not more than 100 miles in practice:

consequently, whilst navigation did not extend much beyond the Atlantic, and was confined principally to regions in which the track is required to be modified, on account of winds, the disadvantage of using Mercator's sailing was not practically experienced. But the length of our voyages have since been greatly extended; more than two hundred vessels from this port alone have, in the last year, sailed on a voyage to circumnavigate the earth. The Pacific is now oftener crossed than the Atlantic was in the time of Mercator and Wright, so that ten times the amount of saving can be now effected in the length of the voyage. From Liverpool to New York, scarcely a hundred miles can be saved; whilst, in a voyage from Panama to Shanghai, a saving of 1200 miles is effected.

But this is not all the advantage to be derived from a knowledge of the principles of great circle sailing in the Pacific. Previously to 1847, the route proposed for steamers, between the west coast of America and China, was from Panama, coaling at the Sandwich Islands—a distance of about 9,500 miles, against 5,000 by the route known by the name of Lieutenant Maury's track. By the chart, the Panama route appears the better; but, on examining the globe, the error of the chart is made apparent. We need not, however, select as our illustration a track in which our American friends are more interested than ourselves. There is a route which might be daily traversed by Liverpool sailing ships, which, as a case of great circle sailing, may be adduced as an example of its value. Many ships that take out freights of deals, slate, or bricks to Australia, call, on the homeward voyage, at the Chincha Islands for a cargo of guano. The route usually taken is by the north of New Zealand—the most direct, as appears by the chart, but not so if we consult the globe. The distance by the great circle is nearly 1,000 miles less. But this is not the only advantage. The great circle takes the ship into regions in which the winds are more favourable, and, in other respects, more advantageous for navigation. (*See plate No. 1.*)

A friend of mine was speaking of great circle sailing, a few days since, when he remarked that he did not much value it, because the mariner should consult the winds, and be rather guided by them, than be induced to adopt the great circle route in shortening his distance. I agree with him that the greatest value should be attached to favourable winds. No practical man would advocate the adoption of any route without considering the winds that prevail in the region through which he is required to navigate; but I contend, that, with all the knowledge of the winds that I hope may hereafter result from the system introduced by Lieutenant Maury, still the mariner could not avail himself



of the advantage of such knowledge, if ignorant of the principles of great circle sailing. Where is the mariner, whose knowledge of this earth is derived from a chart of Mercator's projection, who would ever think of sailing to the southward so high as the 54th parallel, in order to reach the Chincha Islands? For the sake of favourable winds, the passage through Cook's Strait was proposed, but never would it have been suggested to enter the regions of the westerly trades, except by one who understood the principles of great circle sailing.

But I will now refer to another example, to prove the necessity of a knowledge of this earth as a globe, in order to avail ourselves practically of any acquaintance with the nature of the winds that prevail in various regions of the ocean. Great circle sailing does not effect so much saving of distance under some circumstances as under others. If we have the equator between the ship and her port, a considerable saving in distance cannot be effected: thus, in a voyage between Panama and Australia, the difference between Mercator's track and the great circle route is only 170 miles, if it were practical. But New Zealand comes in the great circle track, so that there are three routes from which the mariner can make his choice, neither differing more than 100 miles from the other; they are the rhumb, or Mercator's track, the great circle route by the north of New Zealand, and the great circle by the south of New Zealand. These routes, separate from each other 2,000 miles and upwards, have winds of a very different character prevailing. I was consulted as to the best route a steamer might take in sailing from Panama to Australia and back. Had I known no more of the earth's surface than that which I derived from Mercator's chart, I should have had the difficult problem to solve of balancing winds against distance. But the knowledge of the earth's true surface made the question easy of solution. I find by the south of New Zealand the most favourable winds that blow for a voyage from Australia to Panama. From Panama to Australia, by the great circle, north of New Zealand, we get as favourable winds as by the rhumb track; and, although we save only 70 miles of distance, we avoid the innumerable dangers which lie in the Mercator's track, in which we should have been entangled in the Low Archipelago, in Dangerous Archipelago—ominous name—amongst coral reefs without number, atolls, lagoon islands, innumerable rocks, and unknown islands. This perhaps forms the most striking illustration of the value of great circle sailing, in giving us the choice of more than one route. (*See plate No. 1.*)

There was, however, one objection that existed some years since to the value of great circle sailing. It was said that, unless the distance

in longitude of two places is considerable, great circle sailing fails to save much distance; and, on the other hand, when the difference of longitude is very great, this sailing cannot be adopted, and thus the sailing withholds its chief advantage in practice when its value in theory is greatest. Thus, in an Australian voyage, we should save more distance than in any other; but from the nature of great circle sailing, it is for that purpose impracticable, since it would lead the ship directly across the south pole.

This I found to be the most formidable obstacle seven years ago, when I attempted to devise means of bringing great circle sailing into general use. For the purpose of removing this difficulty, I endeavoured to solve this problem:—If it be undesirable for the mariner to approach the pole nearer than any given latitude, how can he sail by the shortest route without violating this restriction? This problem I solved by the invention of a new sailing, which I call “composite sailing.”

To explain its nature, and demonstrate the fact of its being a complete solution of this problem, we will have recourse again to the principle of the carpenter's chalk line. This line we have found to give us the shortest track, subject to restrictions. It gives us, absolutely, the shortest track over a plane; but on the surface of a globe, restricted by the rotundity of the surface, it describes the arc of a great circle, that being the shortest track over such a surface. In composite sailing we have a second restriction, not altogether a physical one, but rather a prudential one—we ought not to go nearer the pole than a given latitude. Let us, in the artificial globe, substitute a physical restriction for the real prudential one, by having the parallel raised above the surface. Now the string, when subject to tension, describes that which we call the “composite track.” It is the sailing made by Australian ships that have made rapid passages, and is frequently denominated great circle sailing.

I have been charged with something like presumption in laying claim to the honour of being the inventor of a sailing. During the past summer, this matter was the subject of a correspondence with Lieutenant Maury. I may perhaps be allowed first to observe that my remarks, which induced this correspondence, were made in consequence of having read this paragraph in a Liverpool newspaper, headed “Lieutenant Maury's Great Circle Route to Australia,” which is nothing more than a description of a voyage similar to those already accomplished by Boyce, Forbes, and others; and I now feel thankful to Mr. Rankin for having given me the opportunity to establish for Godfrey, Boyce, Forbes, and others, the honour

due to them, which would otherwise have been claimed by some of the captains of the American clippers ; and, if I am entitled to any honour as being the inventor of composite sailing, and had then failed to establish my claim, it might hereafter have been assigned to Lieutenant Maury. The following paragraph is extracted from that gentleman's own book, published but last year, in which, after referring to the rapid voyages which might be accomplished by this route, he concludes by adding—"This opinion may be rash, or the expression of it may seem like a boast ;" so that he fully implies that he claimed the originality of the idea for himself. I will now, with your permission, read that part of my letter to Lieutenant Maury which that gentleman omitted to read at the Town Hall :—

"In a late edition of your sailing directions, you have given instructions for making a speedy passage to Australia and back, and these have been reprinted in Liverpool as your great circle route. This route is, however, that which, in my work before alluded to, is termed 'composite sailing,' great circle sailing being inapplicable to such voyages. This sailing was original with myself. The name was never employed in navigation till the admiralty published it in the work of which I was the author. When first my ideas of the subject were submitted to men of science, the principle on which this sailing was founded was condemned as being incorrect. For years I had to combat with those who contended that this sailing was a fallacy, and, in demonstrating its accuracy, I received most valuable assistance from my friend Mr. Rae, who displayed much mathematical ability in establishing the fact of the truth of the principles on which composite sailing is founded. In May, 1850, I delivered a lecture on this subject at the Society of Arts. I had then thought that it was fully established ; but after this I had letters from gentlemen who stand high as mathematicians, written under the impression that I was in error. At length the truth of its principles was established, and it has taken its stand in most new works as a 'sailing,' and now, because I have said this is my proposal and not yours, your friend Captain M'Kay, of the 'Sovereign of the Seas,' has stated that 'composite sailing' does not possess sufficient originality to entitle me to the honour of its being considered as an invention, because it is but a simple modification of the principles of great circle sailing as known for three or four centuries—'old as the hills.' If so simple, how came it to pass that I had so much difficulty to convince my brother mathematicians of its truthfulness ? It is simple, no doubt in practice, for the courses are taken out from my tables by inspection ; but, certainly, my having furnished the means for the navigator to

conduct this sailing without calculation does not reduce its merit. Sorry should I be to believe that these remarks should in any manner be construed into an attempt to reduce the credit due to Godfrey, M'Kay of the 'Sea,' Boyce, Forbes, and other captains, who have displayed an amount of skill in conducting composite sailing which will entitle them to be regarded as men of whom our country may be justly proud. Captain Godfrey, of the 'Constance,' first brought this 'sailing' into successful practice in 1849, having made a voyage from Plymouth to Adelaide in 77 days. He had previously tried the maximum latitude of  $55^{\circ}$ , the same now suggested by yourself; but he reports that light winds prevail in the higher latitudes; he therefore preferred the maximum latitude of  $51^{\circ}$ , by which he made his then unprecedented voyage. Afterwards, in the 'Statesman,' he accomplished the same voyage in 76 days. Since that period M'Kay of the 'Sea,' Boyce of the 'Eagle,' Forbes of the 'Marco Polo,' and other shipmasters out of this port, have made the voyage in still shorter periods. In fact, this sailing is now adopted in navigating the great number of ships that leave this port for Australia, and it is found that ships make this route in about 20 per cent. shorter time than those who pursue the previously adopted track. Captains Forbes and Boyce simultaneously, in 1852, adopted composite sailing, with extraordinary success, in returning from Australia, as well as on the outward voyage; and, if we make allowance for the advantages of distance and winds which New York captains will possess over those of Great Britain in making a voyage to and from Australia, and also deduct the time that the 'Eagle' and 'Marco Polo' remained in Australia, we may claim for Liverpool captains the honour of having already accomplished that which you say 'it will seem like a boast when I venture to predict that such will hereafter be the case.' In 1849, the same year in which Captain Godfrey made his celebrated voyage to Australia on composite sailing, Captain Boyce adopted the same track out in the barque 'Pakenham,' and also composite sailing on his homeward voyage; and although he did not accomplish this voyage in so short a time as he afterwards did in the 'Eagle,' still, when we allow for the class of vessel he then navigated, and the heavy cargo of copper ore he brought home, this voyage in 1849 entitles him to as much credit as that which has been awarded him on account of his more rapid passage out and home in 1852."

Although Lieutenant Maury did not read this part of my letter at the council chamber, he commented on it thus, as reported in the local papers:—"Although Mr. Towson was not the inventor of great circle sailing, he had invented and computed an excellent set of tables which rendered

the practice of great circle sailing available in cases in which it would not otherwise have been employed; and so much did he value those tables that he supplied the ships of the United States navy with them. Connected with these tables was a sailing which Mr. Towson had designated 'composite sailing,' by which he had enabled the mariner to take the nearest practical route when great circle sailing is not available. Now, it so happened, that during the last year, in examining the winds and currents, he came to the conclusion that the sailing directions of the British Admiralty did not inform the mariner of the best Australian route, and he strongly recommended another. This track, since he arrived in Liverpool, he found to correspond with that which Liverpool vessels take in their route, founded on 'composite sailing.' This happened to be the best for winds as well as distance, and it was on that account he proposed this route; but he now finds that Liverpool captains have a route of their own, by which they save 20 per cent. in respect of time."

In claiming for myself that which I believe to be my due, I am anxious that I may not be the means of doing an injustice to those who, in practically carrying out the principles of 'composite sailing,' have rendered themselves deserving of our highest consideration. Nothing has given me more pain than occasional remarks that have fallen from some of my injudicious friends, who have spoken lightly of the talent displayed by various captains who have made splendid voyages, because they have adopted 'composite sailing'—as if the credit were due to me and not to them, or that navigation were so simple a science that any one could accomplish one of the most stupendous voyages by means of a set of tables. Little can such persons have thought of an Australian voyage, of the skill and appliances required for the accomplishment of such a feat of art. Navigation, truly, has drawn extensively on every science, but it detracts not from the merit of the modern mariner that he has so largely availed himself of the skill of scientific men. We think not the less of the mariner because he uses the chronometer which Harrison and Arnold have brought to a practical state of excellence, nor because he uses the logarithms which Napier has invented, nor the sextant of Ramsden, nor the meridional parts of Mercator or Wright, nor the lunar tables of Mayer. The reverse is the case; that mariner who employs the greater number of the aids which science has submitted for his use, is deemed the most worthy of distinction. On the other hand, I have equal cause of complaint when the accident or the errors of the navigator are laid to my charge, because he has used my tables, or adopted 'composite sailing.'

A lamentable wreck took place in June, 1849. The brig 'Richard Dart,' Captain Potter, commander, sailed from Gravesend, in April, on a voyage to New Zealand, with forty-six passengers. On the 19th of June the ship was wrecked on the north side of Prince Edward's Island; all the crew and passengers, except ten persons, were lost, and those that escaped suffered dreadful privations. In April, 1850, there were some remarks in the "Nautical Magazine" tending to imply that this loss was the result of the adoption of composite or great circle sailing; and in the following May I was personally charged by the owner of the 'Richard Dart' with being the cause of her loss; and an insinuation of the same class was afterwards made in the Theatre of the Society of Arts. I am confident that the absurdity of such observations will be perceptible to all present. Who would imagine that a set of tables, compiled for the purpose of facilitating the practice of great circle sailing, would render unnecessary a good look-out, or the setting down of the ship's place and course in the chart? If the author of a sailing be chargeable with all the wrecks that occur to ships that adopt such a sailing, with how many wrecks is Wright chargeable on account of his introduction of Mercator's sailing? It was but a few days since that we received the account of the loss of the 'Meridian,' on the island of Amsterdam. This island, and that of St. Paul's, lie on either side of the rhumb line, or the track by Mercator's sailing; and yet no one attributes this loss to the captain's having adopted Mercator's sailing. One of the advantages attending the composite route of  $51^{\circ}$  is that there is no island or rock lying in that track, or near it, if we except Kerguelen's land, which is in  $50^{\circ}$ , and its approach is marked by strong indications to warn the mariner, if he, by missing his reckoning, should approach too near. Then, again, a little more than twelve months since, a Liverpool captain wrote home to his owners, as an excuse for having made a voyage of 112 days to Australia, that it was on account of employing what he called great circle sailing, which he assured them he would never do again. The introduction of 'composite sailing,' so far from reducing the amount of ability required by a captain engaged in Australian voyages, makes a demand for higher qualifications and a greater amount of judgment than were previously required.

'Composite sailing' is the art of navigating a ship by the shortest practical or desirable route. It is longer than the great circle, but shorter than by Mercator's sailing. The word "desirable" allows a great amount of judgment in determining its limits. One captain may consider one latitude desirable, and another captain may choose another maximum latitude. Thus some have made  $47^{\circ}$  their maximum latitude,

whilst others have preferred  $51^{\circ}$ , in the voyage to Australia. And it must be observed, that although there may be many different routes selected as the best by different mariners, each may adopt composite sailing. He, however, who selects the highest latitude makes the shortest route; but each makes the shortest possible route under the limitation of not sailing to a higher latitude than that which he has selected as the highest that it is prudent to sail to under the peculiar circumstances of the voyage. Even the same captain chooses a different route under different circumstances. Thus Captain Boyce ventures to  $57^{\circ}$  with a cargo of copper ore; but with passengers, some of whom are suffering from the effects of a tropical climate, he does not venture higher than  $47^{\circ}$ . Captain Peat started on a voyage in the 'Persian,' with emigrants, with the intention of making the favourite route of  $51^{\circ}$ . In passing the line, however, he had fever on board. At the period when he had to choose his maximum latitude reaction had taken place, especially amongst the children; this induced him to lengthen his voyage, by fixing on the lower latitude of  $46^{\circ}$ . Then, again, there is a route out by the Cape, and a route home by the Horn, both 'composite' routes. In fact, there is no practical application of navigation that requires of the navigator a clearer perception and a greater amount of skill than voyages in which 'composite sailing' is adopted.

Imagine that we were assembled together to pass judgment on some splendid work of art—a piece of sculpture, the work of some modern Flaxman; and suppose you were addressed thus by some one present:—"You give the whole of the credit to Flaxman, but none to me, who made the instrument by means of which alone he could have accomplished this work;" your reply would be this: "No doubt your instruments were good, or they would not have been employed by such an artist; but the merit of making these instruments is of a different order to the talent of the artist who uses them. Place your instruments into the hands of a country stonemason, and, instead of producing such a splendid specimen of art as that before us, he would only have destroyed the valuable block which he had vainly attempted to carve into form." So it is with "composite sailing"; so it is with all other appliances with which the mariner is furnished. In the hands of such men as Godfrey, Boyce, and Forbes, they have been employed in accomplishing voyages that have astonished the commercial world: whilst in the hands of Captain Potter and others they have served only as an excuse for their own accidents or their blunders.

For the purpose of further proving that the shipowner cannot too

highly value talent in connection with Australian voyages, I will enter into details connected with some of the most celebrated Australian voyages ; and I hope this evening to establish the fact that the rapidity with which these voyages have been accomplished has not been the result of chance, but of skill. There is no error connected with this subject more provoking than that which is so frequently propagated by men who call themselves practical men, that which we so frequently hear repeated when an extraordinary voyage is spoken of. "Have you heard of the 'Eagle's,' or the 'Marco Polo's' rapid circumnavigation of the world?" "Yes," is the reply, "but this is not on account of the skill of their commanders, who are but men of ordinary ability, but of chance." When Captain Godfrey made his first voyage in the "Constance" in 77 days, so prevalent was this idea that a gentleman whose standing is high in the nautical world addressed me thus, in the theatre of the Society of Arts :—"No doubt Captain Godfrey is a very clever man, and the route he took was a very good route ; but do not imagine that his having made his voyage in such an incredibly short time as 77 days resulted from these circumstances. It has occurred once, but depend on it he will never do it again." And, in order to convince me that he believed what he said, he assured me that, if Captain Godfrey ever again made the voyage in so short a time, he would send me his head. I had, however, the pleasure of calling on him to perform his promise ; for Captain Godfrey afterwards, in the "Statesman," made the voyage in 76 days.

No! Depend upon it, chance has nothing to do with such affairs. No man knows better than De Morgan the doctrine of chances, of which he has so ably written. Tell him that out of the port of Liverpool 800 vessels proceeded to Australia in the last year, and that a more limited number had proceeded from this port to that distant colony for many years, and ask him in how long a period, according to the doctrine of chances, would be connected together the shortest passage out from this port with the shortest passage home. He would reply that there is no period within the limit of time, if even time were prolonged to a period beyond the idea of the most speculative, that would bring such an event within the limits of probability. But we have instances of three extraordinary voyages, and four extraordinary voyages, made by the same captain. We must then look to other sources, not to chance, but to skill.

Previously to 1848 the voyages to Australia were conducted upon the same principles as at present, until the latitude of between 30° to 35° S. had been attained. Some years since it was discovered that



there were frequent occurrences of a rotatory storm, and that these storms, after leaving the Cape, pass away to the southward, extending their southern edge as far as  $46^{\circ}$  to  $48^{\circ}$  south. Now, since, by the well known laws of rotatory gales in the southern hemisphere, they revolve from left to right, or in the direction of the hands of a watch, near to the Cape they assume the appearance of a westerly gale. But it was found that if we were four or five degrees south of the Cape, being then on the southern or left edge of the gale, it was experienced as an easterly gale, and mariners were warned to avoid going further south than  $37^{\circ}$ . When the attention of Captain Godfrey was first directed to the saving of 1000 miles of distance that might be effected by means of composite sailing, this idea suggested itself to his mind :—" These rotatory gales must have a limited range ; and if I can find a latitude to which they do not extend, I shall not only shorten my distance, but shall also avoid these gales altogether." This idea he fully matured in the "Constance," and he also came to the conclusion that the most favourable maximum latitude is  $51^{\circ}$ , a conclusion which has been established by the fact that the ten shortest voyages out have been made on this route. By thus giving the Cape a wide berth we not only save distance, but we avoid the region of storms. With the exception of a supposed rotatory gale experienced by the "Marco Polo" on her last voyage to Australia, in the neighbourhood of Kerguelen land, and another in the same neighbourhood, supposed to have been experienced by the "Argo," such gales have never been recorded in the composite route after passing the Tropic of Capricorn. On the other hand, in the latitude  $51^{\circ}$  we have continued westerly winds, with a heavy rolling sea from the west ; and also the wind in this region seems to blow with more equal force than the winds we are accustomed to experience, except in the neighbourhood of Tristan d'Acunha and Kerguelen land, where the steadiness of the wind appears to be interfered with by the interruption of the land. I am not, however, convinced that the captains of the "Marco Polo" and of the "Argo" have sufficient grounds for establishing the fact that they were rotatory gales which they experienced, although they had good *primâ facie* evidence of the gales being of the character they describe them to be ; still, it is only simultaneous observations of different vessels about 100 miles distant from each other that can fully establish the fact.

I have alluded to the "Persian" and other vessels that have been navigated in a lower latitude, on account of the health of the passengers. No one can but commend the conduct of the captain who would be actuated by such a motive. In fact, I have given such advice to those

who have done me the honour to consult me. My advice has been this: If your passengers are in good health, they will not suffer from the climate of  $51^{\circ}$  south; but if reaction from fever exists to any considerable extent, I recommend the latitude of  $46^{\circ}$ . I now, however, doubt the correctness of my advice. I do not think the "Persian" had milder weather off Crozet Island than other vessels had off Kerguelen Island. With the meager data of the few records of the temperature kept on board Australian ships, I should come to the conclusion, that along the belt of the westerly trades there is no decided difference in the temperature of the air from  $46^{\circ}$  to  $50^{\circ}$  south. I acknowledge that I have means far too slender to consider such a fact as established; still it proves how important it is that the proposal of Lieutenant Maury should be carried out, that we should embrace every opportunity to collect data respecting the temperature of the air in these regions, otherwise the humane motives of Captain Peat and others, who sacrificed time for the benefit of their passengers, so far from accomplishing the object they have in view, may produce the contrary result, by exposing them to a longer passage.

The "composite" route home is not so fully established in its details as that by which the voyage out has been conducted. Till of late, all our sailing directions advised the mariner to return by the Cape, the voyage home as far as the Cape being over the same track as the voyage out. We have shown that the great advantage of ships sailing by the composite route to Australia arises from favourable winds. About a thousand miles, or seven per cent. of the distance, is saved; but 20 per cent. of the time of the voyage is saved; consequently 13 per cent. is saved by favourable winds. In fact, so constant are the winds over this route, that a steamer has only occasion to use that auxiliary power during one-fifth of the passage. How then could it be expected that vessels could make a good passage by returning by such a route? The first passage made by the "composite" route, by the Horn, which has come to my knowledge, was made by Captain Boyce, in the "Pakenham," in which case he left Australia, striking into the parallel of the Horn, weathering the Horn by this parallel. You are all acquainted with his subsequent return voyages by the "Eagle;" also, the two voyages by Captain Forbes, in the "Marco Polo." I had not the pleasure of Captain Boyce's acquaintance previously to the conclusion of my last paper, a fortnight since, when I had the pleasure of being introduced to him, I have not, therefore, the means of illustrating the present subject by reference to the details of his voyage, and so am obliged to confine myself to prove the fact of the extent of ability that may be displayed

by Australian captains, by reference to Captain Forbes, in his celebrated return voyages in the "Marco Polo." I have not the least doubt, that had I the power of illustrating this subject, by reference to the details of the route of the "Eagle," I should have additional means of proving to you that in voyages from Australia the man who possesses the highest attainments must, under similar circumstances, make the quickest voyage.

From the imperfect data we possess, I believe that the circle of westerly trades of the southern hemisphere revolve, not around the southern pole as a centre, but around a point situated on the 85th parallel, where it intersects the 40th degree of east longitude; and it also appears that the isothermal lines have the same centre: consequently the mariner, in returning by the Horn, chooses a higher latitude than on his voyage out to Australia. This phenomenon is no doubt the result of the southern polar land, together with Cape Horn, which diverts the current of warm water and warm air to the south. The "Marco Polo" made her two voyages on the parallel of 60° to 61°. In the first voyage home of the "Marco Polo," I was struck, in examining her chart and log, with the great amount of nautical skill displayed by her commander, especially in that part of her route which extended from 100° W. to the south-east trades. In this part of her route, if a line could have been stretched over the surface of the earth, I do not believe the "Marco Polo" deviated five miles from that line in a run of 3,000 miles; and this feat of seamanship and navigation was accomplished under circumstances requiring every attention and an extraordinary amount of skill. We have no variation charts for these latitudes, and the variation changes rapidly, and consequently the mariner must be constantly observing to correct his compass. Another circumstance connected with this voyage will serve to illustrate the value of the talent of Australian captains. Thirty-two days before the "Marco Polo" started from Melbourne, a ship started from that port, commanded by a captain who intended to adopt the "composite" route of 61°. He certainly made a tract somewhat approaching the "composite" route; but I find him on the parallel of his maximum latitude in 70° W., the longitude of the Horn, at the same time that Captain Forbes in the "Marco Polo" was sighting the Horn some 200 miles to the north of the other ship, and before the latter had gained the latitude of the Horn, Captain Forbes had cast anchor in the Mersey. Let us inquire whether this was the result of accident or of skill. We have already observed that near the Cape there are frequent rotatory storms met with. The same is the case with the Horn. But this difference exists, that beyond the regions

of the Cape storms there is a track of ocean at which steady winds prevail. Not so with the Horn. Graham's Land is so near to the Horn that when a rotatory gale blows in this region it extends from shore to shore. Captain Forbes, knowing such to be the case, and also that a westerly current set near the Horn, sighted land, and, availing himself of the northern side of the centre of the gale, had the combined aid of the wind and current—whilst the other captain was on the south side the centre, with a strong head wind; on attempting to get north, the wind was still ahead, and he at length gained his latitude by beating to windward. Although this remarkable voyage was so worthy of commendation, the last voyage home, which so much disappointed the friends of Captain Forbes, was that which raised him far higher in my esteem than anything he had previously accomplished. We ought not to appreciate always the amount of ability displayed by a mariner by the shortness of the time occupied by his voyage, except we take into consideration the circumstances under which such voyage was accomplished. In their first voyage from Australia, Captains Boyce and Forbes (in the "Eagle" and "Marco Polo") had the advantage of an Austral summer; in the last they had to contend with an Austral winter. In June last we find at Melbourne four captains whose ability stood the highest for accomplishing a homeward voyage—Captains Boyce of the "Eagle," M'Kay of the "Sea," Coleman of the "Kent," and Forbes of the "Marco Polo." With the month of June south-east winds set in—a circumstance which might be regarded as the most unfavourable for a homeward voyage. According to the chart, this appeared to be a head wind—the most unfavourable that could blow. First started the "Sea." Confident in the superior sailing qualities of his ship, Captain M'Kay started at his time, contrary to the advice of those with whom he was connected. From Melbourne to Wilson's Promontory there are a series of headlands running out southward. He left Melbourne on the port tack, but having made what he considered sufficient southerly to weather these easterly headlands, he tacked; but nearing too closely one of these headlands, he lost his ship and his own life. Next started the "Kent," Captain Coleman; and in giving an account of his run against the "Marco Polo," I shall take his own letter in the *Times* as my authority. He succeeded in getting out at the east of Bass's Straits five days before the "Marco Polo." Then the "Marco Polo" started, south-east winds still prevailing. But Captain Forbes was better acquainted with the surface of the globe he had to navigate; he perceived that the port tack was that which would lead him more directly to his port than the starboard tack, and he ran out, therefore, at the western entrance of Bass's Straits. Now, if we

refer to the chart as our guide, with a south-east wind, the starboard tack is that which appears to lead to Cape Horn, and the port tack appears to lead in an opposite direction. But on referring to the globe we find that the reverse is the fact: the port tack takes us towards the Horn, whilst the starboard tack takes the ship further from that Cape. Captain Coleman acknowledges that the "Kent," which on the 5th of June had left Melbourne, at seven a.m. of the 26th of June, was seen astern of the "Marco Polo," which had left Melbourne on the 10th of June; but it is equally true that before ten a.m. the "Marco Polo" was astern of the "Kent," and that the "Kent," with a foul wind from the north-east, walked out dead to windward of the "Marco Polo," and at eight a.m. on the following morning the "Marco Polo" was eight miles dead to leeward, bearing south-east, with the wind at north. If Captain Forbes were to conduct a hundred voyages he could never receive a higher testimony in favour of his nautical skill. By setting at defiance old conventional rules, by losing sight of the distorted figure of the earth as represented on the chart, he cut off the "Kent," which had started five days before—a ship which Captain Coleman's testimony proves to be a far better sailing vessel than the "Marco Polo," and commanded, too, by a captain of high nautical skill; in fact, the unfavourable account he gives of himself in this letter is the only disparagement that can be adduced against the ability of Captain Coleman. He tells us that, with the wind north-east, the "Kent" walked out dead to windward. For what purpose? If to prove the weatherly qualities of the "Kent," he may have accomplished his object; but if he imagines he neared his port by such a course, he has much to learn before he will win the race against some of our Liverpool captains, although he may command a ship of superior sailing qualities. The "Marco Polo," however, the next morning, was found dead to leeward of the "Kent"—the very situation she ought to be in. It appears that the "Marco Polo," after sailing south and west for some hundreds of miles, finds the wind from the north and west; she then takes the great circle track, which leads to  $60^{\circ}$  on this parallel, with fine westerly winds, until, 141 W., she is stopped by ice close packed, and is obliged to beat to northward to clear this ice. Notwithstanding this untoward circumstance, which prolonged the time of her voyage four or five days, she still had cut off the "Kent," which had started five days before her. Having thus run to northward and cleared the ice, she again ran away to the southward, first to shorten her route, and next to obtain more favourable winds, and by her old route weathered the Horn, when again the "Marco Polo" is found ahead of the "Kent;" but to use the words of Captain Coleman, "neither did on that occasion the flying

ship have any advantage over the 'Kent,' but rather the reverse." The "Kent" was telegraphed in the Downs one day before the "Marco Polo" was sighted from Holyhead—the distance to the Downs being 165 miles or thereabouts greater than to Holyhead. This is one example of the great value to be attached to superior skill for conducting composite sailing, in which both captains were possessed of more than the ordinary amount of ability. If we judge from Captain Coleman's account, the "Kent" is a ship that should have made the voyage from Australia in ten days less than the "Marco Polo;" instead of which, allowing one day for the difference of distance of the Downs and Holyhead, still the "Marco Polo" accomplished the run in three days less time.

When first the admiralty did me the honour to publish my tables, I anticipated a greater amount of improvement from its application to what I denominated windward great circle sailing than from any other of its practical uses. Although with respect to composite sailing it has been employed with a degree of success surpassing my most sanguine expectations, still, in working a ship to windward, in very few instances am I aware of its having been brought into application. The case I have just given of the "Marco Polo" leaving Melbourne is a fine illustration of this application, and is in fact the idea which suggested itself to the mind of Captain Forbes when he made the boast, which has subjected him to animadversion, that he would turn a foul wind into a fair; for practical purposes, he has kept his word. Windward sailing I thus describe:—

When a ship cannot, on account of adverse wind, sail directly to her port, she obviously ought to be put on that tack by which she nears her port by the greatest proportion of the distance sailed. It is also evident that she must do this when her track deviates by the least amount from the direct line which connects her with her destination; or, in other words, when she is put on that tack which deviates less from the true course than the other tack. In adopting this rule it must however be especially borne in mind, that the true course alone can serve as a guide in choosing the tack; and that the great circle, and not the rhumb, is this true course. But, since the mariner is more conversant with the rhumb than the great circle, too much attention cannot be directed to the importance of making this distinction between these two courses in connection with windward sailing. In crossing the Pacific, the rhumb course frequently deviates four points from the true course: under such circumstances it is impossible that the mariner can navigate his vessel with advantage if he fail to make himself acquainted with the great circle course.

The term "windward great-circle sailing" is employed with special reference to these facts. This new form of describing the application of the true course is rendered necessary on account of the prevalent erroneous opinion—that "to a sailing vessel great circle sailing is of comparatively little value;" and that "steamers, being in a measure independent of the winds, could more readily than sailing vessels avail themselves of the advantages of great circle sailing." The reverse is the fact: to a sailing vessel, the advantage of being guided by the true course, when contending with adverse winds, is fourfold as great as that which is conferred on a steamer. Thus, for example, the increase of distance arising from the direct track being diverted two points is only 1 mile in 12: but if a ship that sails six points from the wind deviate two points further from the angle of the true position of her port on account of the wrong tack being chosen, she cannot in the least degree near her port; whilst, under the same circumstances, the knowledge of the true course would enable the mariner so to choose his track as to make good  $8\frac{1}{4}$  miles by a run of 12 miles.

The rule for windward great circle sailing is as follows:—Ascertain the great circle course, and put the ship on that tack which is the nearest to the great circle course.

We can give no better illustration of an extreme case of this application of great circle sailing than that already given of the "Marco Polo" leaving Melbourne. Had that ship stood on the port tack 1000 miles, with the wind S.E. by E. she would have neared the Horn 874 miles; whereas, if the "Kent" had stood 1000 miles on the starboard tack, she would have been 200 miles further off from the Horn than when she started, although by the chart the reverse appears to be the case. To make use of the words of the Hydrographer in reference to this subject, this principle is valuable "not only in those strong and glaring cases where a large amount of distance may be obviously saved, but in the more everyday work of selecting the most advantageous tack on which to lay the vessel with a foul wind." Scarcely have I examined a chart or a log-book without perceiving that this is not perfectly understood. I am frequently informed that they could not get so far south as their intended maximum latitude. Now this is an impossible occurrence with a ship of ordinary weatherly qualities. If the wind be less southerly than E.S.E., she would undoubtedly do better on the port tack till she got into the regions of the N.W. trades; if more southerly, she could make easterly on the starboard tack.

In a New York voyage, if head winds prevailed, I proved seven years since that three days might be saved; and yet I have no reason to

believe that in such voyages it has ever been adopted, except by Captain Reed, of the "Iowa," in a late voyage. The success of this one trial was quite equal to that which I had anticipated.

Until within a few months the principles we have explained, and which have been employed with such signal success by sailing vessels, have been totally rejected in navigating steamers to Australia. I had promised to this Society a Paper on the best route for steamers to and from Australia, but now it is unnecessary; the "Harbinger" and "Argo" have solved the problem, and I hope that in a few weeks news from the Great Britain will confirm the fact. Up to within twelve months, steam to Australia might be regarded as a failure; that is, sailing vessels having made the direct passage in less time than steamers, we could not regard steam as a successful experiment in such voyages. The causes I consider to be, first, that the commanders have been bound, by contracts entered into by the directors of the companies to which their ships belong, to land mails or passengers at intermediate places which, on the chart, appear on the route to Australia, whilst, if they had consulted the winds and the globe, they would have perceived that such intermediate stations were undesirable; and secondly, that the previous experience of those in command of ocean steamers had led to a system of practice unsuitable to the management of steamers bound to and from Australia.

The principle ocean steamers had made their voyages within the regions of the variable winds: the consequence is, that in such cases the wind is disregarded in selecting the route, and out and home these steamers have been navigated by the shortest route. When the winds have been favourable, the sails have been employed; but when the wind is adverse, it is steamed up against. No other practice would be successful in these regions of variable winds; but in a voyage to Australia, in a route of upwards of 13,000 miles, steam is only required for about 3000 miles if the tracks of our sailing vessels be adopted. But instead of being guided by the winds we hear of one vessel, in steaming up against the winds, reduced to the necessity of falling to leeward for coals. Then, again, because by the Cape it is about 7 per cent. shorter than by the Horn, they have returned as well as gone by that route. Then, again, we have instances of three coaling stations out, and three coaling stations home; so that, if we allow four days for coaling, from this cause alone twelve days on each passage has been wasted. At length sailing vessels taught steamers to return by the Horn, and then the challenge was thrown in Australian newspapers in these words—"Steam-ship 'Cleopatra,' guaranteed quickest route home." "Steam



to England from the colonies on the 28th July, 1853, *via* Wellington (New Zealand), calling at Rio Janeiro and Madeira." Here we have three coaling stations; and how situated? After steaming about 1200 miles to Wellington, I suppose we should find that she had neared the Horn about 300 miles. Having arrived at Rio, she will have the whole force of the north west trades to contend against. I am not aware of the number of days her voyage occupied; but if the prospect held out be realised, it is a different result to that which I should have expected.\*

The advice which I have given is to coal on the outward voyage at Bahia, and on the homeward voyage at the Falkland Islands. This route has been successfully followed out in each particular but that calling at St. Vincent instead of Bahia; and for this alteration there is a valid reason, the state of health at Bahia or Rio. If a coaling station on the homeward voyage be required, the Falkland Islands are undoubtedly the best calculated for that purpose. Under such circumstances my advice would, in order to make the shortest voyage out and home by the aid of steam, be as follows:—

By the aid of both steam and wind, proceed to St. Vincent with as great despatch as possible; for economy of fuel is not of so much importance in the first part of the voyage, since it is not probable that more than one-third of the coals which the whole voyage will require will be consumed between England and the Cape de Verd. At this station, having taken a fresh supply of fuel, sail to the calms direct, and until you reach the latitude of 48° use steam freely whenever it is required. By so doing, you will not only make your passage more rapidly, but you will lighten your ship by the time you have reached the regions in which you will depend on sail alone. The course you should take after you leave St. Vincent, should be such as would take you as far at least as 20° west, at the point where that meridian crosses the 30th parallel of south latitude. But should the winds be such as would take you across that parallel at 30° west, you will have lost little by crossing at that point; at least, you will have done better than by not having sailed free through the south-east trades in order to get further east. Between 30° and 48° latitude on the great circle of 50° you will have occasional use for steam. If required, coals could be obtained for steamers at Kerguelen's land, no more expense being required than labour and the most simple machinery. This island, being nearly broken through the centre by the action of the ocean, has

\* The "Cleopatra" arrived at Liverpool, February 24, 1854, after a voyage unprecedented in length for a vessel returning from Australia by the Horn.

its coal strata exposed to the light of day. After passing Kerguelen's land it is very improbable that steam will be required for seven hundred miles. On your return by the Horn I doubt whether more than a half cargo of coals should be taken on board, since between Australia and the Falkland Islands not more than 1500 miles would require the use of steam. A full cargo would tend only to burden the ship whilst under sail, and thus lengthen the voyage instead of aiding the ship. From the Falkland Islands, with a full cargo of coals, you should strike off on the same great circle by which you left your highest latitude, and then economise your fuel, taking advantage of the N.E. trades, and taking care to reserve a supply of coals for the variables, and especially for the channel.

There is, however, another problem which remains to be solved, for which the experience of steamers on the composite routes will soon furnish us the data. Is it desirable that steamers should have any coaling station on the voyage out and home? The number of days during which such steamers as the Great Britain would require steam out or home, I consider, will prove to be about 20. Now, at neither station, either out or home, is more than one-third of the total amount of coal required. Then, by decreasing the amount of coals required by the engines to two-thirds the present amount, we should decrease the power of the engine one-third. But this decrease of power would increase the time required to steam across the regions where the aid of steam is wanted more than from 20 to 24. Then, if one-third the coals is expended in increasing the speed of the vessel so as to save the time lost in coaling, we cannot regard such an expenditure in any other light than a waste. Before, however, we can establish such a proposition as a fact, further data are required.

When reviewing the passages of steamers in comparison with sailing vessels, we have regarded them as failures up to a very recent period. This term must be taken in a restricted sense. In one respect steamers have been superior, in contributing to the health and comfort of the passengers. No one but those who have crossed the tropical calms can form a perfect idea of the distressing feelings they give rise to. With a tropical temperature there is an incessant roll which frequently in these climates affects even the experienced seaman, but to the landsman it is unbearable. Under these circumstances the sickness and fever arise; and to bear out this opinion we have the fact that the mortality of passengers on board the steamers that cross the line is only ten per cent. of the proportion of that experienced by those on board of sailing

vessels. Whilst the sailing vessel is rolling about in the calms, the steamer is making a quick passage through the tropical regions.

But I hope that the evil influence of calms may be greatly reduced on board of sailing vessels. By the reports we have received of vessels that have passed the line by Lieut. Maury's route, calms are very little felt. It appears that the regions on which these calms exist being of a wedge form, with the sharp edge on South America, he recommends that the line should be crossed at  $30^{\circ}$  west, instead of further east; and I have no doubt, from the data by which he supports this advice, that vessels from England to Australia will be benefitted by taking this route. Several Liverpool ships have started with the intention of making this route; amongst them the "Australia," spoken in  $8^{\circ}$  north under most favourable circumstances. I am anxious to hear of her arrival. To cross the line at  $30^{\circ}$  of west longitude was not usual in modern passages to the Horn or the Cape previously to its being advocated by Lieut. Maury. There is no advice more strongly enforced in Horsburgh than to give Cape St. Roque a wide berth. This advice, and many other remarks made in this work, must be disregarded by modern mariners, although they were well suited for the day in which that work was compiled. With such ships as were built some 50 years since, no better advice could be given than to avoid falling into the current that runs round this cape, by which many a ship was carried back towards the West Indies. But what was the condition of our mercantile marine at that time? In order that no vessel should escape the supervision of the British cruisers, and thus infringe our fiscal regulations, the custom-house enforced a law that no British merchant vessel should be longer than three and a-half times her breadth. The tonnage laws co-operated with this regulation to swaddle our mercantile navy into such a state of deformity, that well might the mariner of that day be scared at the idea of approaching St. Roque, although in the present day, with our clippers, we may treat such a fear as a bugbear. We hope the time is passed when the government endeavoured by every means to cripple our mercantile marine, in order that they might keep pace with our ill-formed ships of the British navy.

In concluding the subject I have had the honour of bringing before this Society, allow me to remark that I hope I have proved one point to your satisfaction—that the commanders of Australian emigrant ships are required to be men of superior skill and quick perception, of good natural abilities, and possessing a full amount of that class of education which is best qualified to place a shipmaster at the head of his pro-

fession. That line of ships can only attain a high standing in the estimation of the public whose commanders are men of such abilities. Above all, the captain of an Australian ship should cultivate a clear notion of this earth as being a globe and not a plane. I would not do one of them the injustice to insinuate that he does not assent to the truth of the hypothesis that this earth is a sphere. But we often assent to the truth of a proposition, and yet fail in carrying out its principle in practice. So it is with the mariner. He is so accustomed to regard places to be situated as they appear on his chart, that he ceases in practice to regard the earth as a sphere. I do not recommend him to cast aside his chart, but as frequently as possible to compare it with the globe, and by so doing to acquire the power of discerning in the distorted shadow the substance intended to be represented. To young men who desire to rise in their profession there is every inducement to energy. Never was there a greater demand for talented master mariners, nor was there ever such an opportunity offered to those who wish to avail themselves of the advantages afforded. Fifty years ago, the government exerted their utmost power to cripple the mercantile marine. Now, on the contrary, the Board of Trade have afforded an establishment at this port for the instruction of those who desire to advance in their profession—such as they have never previously possessed. To all present I would say, do your utmost to advance science; do not look too narrowly to the subjects that come within your notice in a utilitarian sense. Although the observations of the gentleman who lately so worthily filled the civic chair of this borough, and those of one of the gentlemen who now represent us in parliament, are true, that science should produce utilitarian results; still, unless we cultivate science for the sake of science, we shall not keep up with the spirit of the age. There are branches of science the utilitarian value of which is not at first seen. I have endeavoured to show you instances in which meteorological observations are calculated to be of great practical value to the mercantile interest of this port. I hope the suggestions of Lieut. Maury regarding a record of meteorological observations at sea will be carried out. Liverpool can afford as much valuable information on this subject as any other port. Its extended commerce takes its ships to every part of the globe. For observation in the Australian tracks, the means that Liverpool possesses cannot be surpassed by any other port. But beyond all, if we were to search every port in the world, I would defy you to produce an individual better qualified to superintend such investigations than Mr. Hartnup. I never met clearer illustrations of

series of meteorological observations than such as have been arranged by him. The solution of the problem of the shortest route to and from Australia is reserved, I believe, for Liverpool; and I see no reason why we should go out of Liverpool for the arrangement of data so important in connexion with the solution of this problem.

## SIXTH MEETING.

ROYAL INSTITUTION.—January 9, 1854.

J. B. YATES, Esq., F.S.A., &c., VICE-PRESIDENT, in the Chair.

THE Secretary read a letter from the Rev. Dr. Hume, in which he regretted his inability to be present at the meeting, and stated that he had requested his friend, the Rev. Thomas Moore, M.A., to read his Paper on "English Dialects," in the event of such arrangement meeting with the approbation of the Society.

At the conclusion of the meeting the thanks of the Society were voted to Dr. Hume, for his valuable Paper; and also to Mr. Moore, for his kindness in reading the Paper in the author's absence, and for the able manner in which he offered explanations on some of the passages of the Paper.

## SEVENTH MEETING.

ROYAL INSTITUTION.—January 23, 1854.

JOSEPH DICKINSON, M.D., F.L.S., &c., PRESIDENT, in the Chair.

AT AN EXTRAORDINARY MEETING, held this evening, the following recommendation of the Council was read and adopted, viz.: "To consider the propriety of voting the sum of £50 to the funds of the Local Committee of the BRITISH ASSOCIATION."

Mr. JOHN JONES was ballotted for, and duly elected an Ordinary Member.

Mr. R. M'ANDREW exhibited three specimens of a remarkably large species of prawn, found on the west coast of Ireland, and bearing a similarity to the African species.

The Rev. Dr. HUME exhibited a mineral from the Coal Measures of Edinburgh, regarding the nature of which considerable doubt exists.

Mr. JOHN LEIGH CLARE exhibited, from the tertiary formations upon the south bank of the Tagus, near Lisbon, fossil specimens of "*Panopæa Aldrovandi*," &c.

The Rev. Dr. HUME offered some explanations on his Paper on "English Dialects," read at the last Ordinary Meeting.

Dr. WILLIAM IHNE read the first part of his Paper on "The Paradise Lost of Milton."

## EIGHTH MEETING.

ROYAL INSTITUTION.—February 6, 1854.

JOSEPH DICKINSON, M.D., F.L.S., &c., PRESIDENT, in the Chair.

Mr. WILLIAM BENNETT, Mr. WILLIAM REES, ROBERT GEE, M.D., Mr. WILLIAM LIDDERDALE, Mr. F. D. FLETCHER, and Mr. F. PRANGE, were ballotted for, and duly elected Ordinary Members.

Mr. WILLIAM BURKE exhibited a Manuscript Work on Book-keeping: also in Manuscript, "The whole Art of Measuring, Practical Geometry, and Mensuration." Both works were very beautifully executed by Mr. J. T. Creighton.

Mr. THOMAS SANSOM, Secretary, exhibited fossil specimens of *Catillus*, or *Inocenamus mytiloides*, from the cretaceous or chalk system.

PROFESSOR GRIFFITH exhibited a series of fossils (including a specimen of *Orthocera calamiteum* ?), from the Aberuddy Slate, a deep

Cambrian formation, in which very few fossils of any kind have ever been found.

Dr. W. IHNE concluded his Paper

## ON THE PARADISE LOST OF MILTON.

"In the vast field of criticism on which we are now entering, innumerable reapers have already put their sickles. Yet the harvest is so abundant, that the negligent search of a straggling gleaner may be rewarded with a sheaf."

*Macaulay's Essay on Milton.*—*Edin. Rev.*, 1836.

AN age is characterised not only by its literary productions, but also by the degree of esteem, in which it holds the productions of former times. The enthusiasm or the coldness shown to them indicates, like the rising or falling mercury, the condition of the intellectual atmosphere, and is a tolerably safe criterion of the prevailing spirit of the age. Shakspeare has gone through periods of comparative neglect and admiration, so have Homer and Dante, Horace, Virgil and Cicero, Voltaire and Rousseau, the Niebelungen and Wolfram von Eschenbach, in proportion as the character of their works was congenial with, or adverse to, successive ages. Shakspeare is now all-ruling, Milton is quite in the "dust and silence of the upper shelf." Perhaps our investigation into the composition and style of the "Paradise Lost" may help us to understand the causes, and to appreciate the justice of this extraordinary neglect.\*

Before entering upon the detail of my investigation, I think it will be necessary to acknowledge and record my veneration for the nobleness of mind, the moral courage and the sublime genius of the blind poet. I do this to shield myself from the odium, to which a frank and unreserved criticism might otherwise expose me. I feel the force and bearing of what Dr. Johnson says in his life of Milton (p. 171): "What Englishman can take delight in transcribing passages, which, if they lessen the reputation of Milton, diminish in some degree the honour of our country?"

But the reputation of Milton is too firmly established, either to need any adventitious support and eulogium, or to suffer much, if at all, from the searching analysis of the critic. If, therefore, I shall be found to dwell chiefly on what appear to me to be blemishes, I trust I shall not, on that account, be ranked among the mean herd of

\* Johnson, (*Life of Milton*, p. 173) already says:—"Paradise Lost" is one of those books which the reader admires, and lays down and forgets to take up again. None ever wished it longer than it is. Its perusal is a duty rather than a pleasure."

detractors who feed and fatten on the body of a noble game, which they have hunted down. Nor would I, on the other side, be one of that abject crowd, who swell, without thought or reason, the general shout of applause or the condemnatory hiss.

It has been well remarked, that even in Milton's own lifetime, when he was poor, old, blind, and neglected, when his political enemies reigned triumphant, the "Paradise Lost" was received by the nation as a great work, and that the sale of 1,300 copies in two years, at that period, is a proof of great popularity.

The time immediately following produced Dryden's well known epigram :—

" Three poets, in three distant ages born,  
Greece, Italy, and England did adorn :  
The first in loftiness of thought surpassed ;  
The next in majesty ; in both the last.  
The force of nature could no further go ;  
To make a third she joined the other two."

I cannot pause to criticise this dictum, which, to say the least, is far less correct than pointed. It reveals total ignorance of the relative merit of Homer, who is all nature, originality, and vigour, and of Virgil, who is all art, imitation, and elegance ; and it certainly overshoots the mark by placing Milton above all the other poets, the world ever produced.

From that time Milton's fame was firmly established and generally acknowledged. But the foundation of a reasonable appreciation of the poet was laid by Addison, who first undertook to analyze and to demonstrate the beauties of the "Paradise Lost." But Addison was, I should almost be tempted to say, too amiable a critic. He practically followed the rule which he laid down, that "a true critic ought to dwell rather upon excellencies than imperfections, and to discover the concealed beauties of a writer." This is lowering the critic to the position of a paid advocate, instead of raising him to the dignity of an impartial judge. It is the general fault of editors, who are mostly too much in love with their authors to be just to him or others.

A greater proof of Milton's excellence than the praise of Addison is the disguised censure of Richard Bentley, the greatest of English and the greatest of European critics. Nay, the fact, that Bentley undertook to edit the "Paradise Lost," proves, that he considered Milton a worthy rival of the great poets of antiquity. But, in his critical annotations, Bentley very ingeniously and astutely, though perhaps not very honestly, exposes the blemishes of the poem, whilst pretending to extol the poet, and to purge his text from the interpolations and corruptions, which, a-



he affects to believe, the incompetent hands of some over-zealous friend and editor introduced into the spotless original of the blind poet. Bentley's criticism, however, is only verbal and textual; he never rises to the contemplation of the poem as a whole; but his remarks are nevertheless highly interesting and instructive; they are invariably clever, sparkling with wit and ingenuity, and they indicate the finest tact for grammatical propriety and correctness of diction. His proposed alterations are, perhaps, not in a single instance real emendations of the text, *i.e.* restorations of the original reading, such as it must be supposed to have proceeded from the author's mind (and such alterations only have we a right and a duty to introduce into the text); they are, on the contrary, suggested improvements, such as a friend of the author would note on the margin of a proof sheet; and it must be owned, a great proportion of these suggestions are so happy and pleasing, that Milton, had he seen them, would no doubt have adopted them readily and thankfully.

Dr. Johnson's *Life of Milton* is a very able and useful performance. Johnson was not a blind idol-worshipper. He had his eyes open to see defects as well as merits; and he had the courage and good sense to qualify his praise, where he saw proper. Perhaps there is something of the rancour of party spirit in the judgment, which he passes on Milton the politician and the theologian; but of Milton the poet, he is, in spite of several exceptions that he takes, an honest and enthusiastic admirer. He speaks of the "*Paradise Lost*" as "a poem, which, considered with respect to design, may claim the first place, and, with respect to performance, the second among the productions of the human mind."

Milton's numerous editors and biographers and all the writers on English literature, as far as I am acquainted with them, express the same transcendent admiration. To name one for all—Macaulay, in that sparkling, though half juvenile treatise, which forms the first of his valuable contributions to the *Edinburgh Review*, expresses the same opinion: "We are sure," he says, "that the superiority of the '*Paradise Lost*' to the '*Paradise Regained*' is not more decided than the superiority of the '*Paradise Regained*' to every poem, which has since made its appearance." Further on he says: "We hasten on to that extraordinary production, which the general suffrage of critics has placed in the highest class of human compositions."

But all the praise so generally and generously bestowed upon the bard of "*Paradise Lost*" and "*Regained*" is summed up and expressed in what may be considered the general sentiment at present, *viz.* that in

the whole range of English poetry there is only one superior to him, and that one—Shakspeare.

Let us now turn to the examination of this wonderful work, the "Paradise Lost." A complete and exhausting critique I do not pretend to give. Such an undertaking would lead me far beyond the limits, to which I am bound in this place. I shall, therefore, but cursorily touch upon the subject matter of the poem, the plan and the mode of execution, and lastly, I shall enter more fully into the style and diction.

With reference to the subject matter of "Paradise Lost," I find, that the general opinion of critics commends it as the best, that could have been found. Mr. Hallam, (*Literat. of Europe*, IV., 24,) whom I select as their representative, says, "The subject of 'Paradise Lost' is the finest, that has ever been chosen for heroic poetry." He goes on to say, "that the 'Iliad' wants completeness, that the subject of the 'Odyssey' is hardly extensive enough for a legitimate epic, that the 'Aeneid' is spread over too long a space; that Tasso is superior both in choice and management of his subject to most of these." "Yet," he concludes, "the Fall of Man has a more general interest than the Crusade."\*

It is foreign to my plan to criticise Mr. Hallam's rash judgment of the "Iliad" and "Odyssey;" nor will I impugn the truth of his concluding sentence, "that the Fall of Man has a more general interest than the Crusades," or, (to generalize his isolated dictum into a theory,) than any event of local or merely partial historical consequences:—I allow this to be perfectly correct; but I deny, *that a subject is adapted for an epic poem in proportion to the general interest it excites*. It is true, that a subject, if generally interesting, secures for the work an attentive hearing, and can hardly fail to make it popular, but the fitness for an epic poem mainly depends upon other conditions and circumstances than either its religious, or national, or historical interest. The poet must not trade upon a popular idea, but he must be able to create interest, where none existed, and maintain it through the variations of political, social, and religious revolutions. The interest must be poetical. This constitutes its title to superiority; all other interest serves merely as a recommendation. The highest questions, which agitate the human mind, the inquiries into the attributes of the Deity, the nature of our soul, and our future state, must for ever possess for us the most thrilling interest; but are they therefore fit subjects for

\* Johnson's *Life of Milton*, page 166 :—"It is justly remarked by Addison, that this poem has, by the nature of its subject, the advantage above all others, that it is universally and perpetually interesting. All mankind will, through all ages, bear the same relation to Adam and to Eve, and must partake of that good and evil which extend to themselves."

poetical narrative? The very cause, which invests them with the sanctity of religious awe, repels as uncongenial the fictions and illusions of the poet; they may inspire the Psalmist to pour forth his soul in prayer and admiration and awe and holy love, but they refuse to be moulded by the epic poet in plastic figures, forms familiar to us, and in which we discover extent, weight, colour, and all the grosser attributes of matter. Let not the epic poet plead the example of sacred writings. It is because of their sacredness that those forms should not be taken from the altar and arrayed as *dramatis personae*, and made to speak and act like other mortal beings, the earthborn though ever so sublime fancies of the poetic muse.\* Who can listen to a conversation of God the Father and God the Son without the silent shudder of a man guilty unwillingly of sacrilege? Who can bear irony put into the mouth of God?† Who can undertake to justify the ways of God to man except by prayer, and faith, and humble submission to Providence.‡

There was a time, when sacred history was the only subject of dramatical composition, when the Biblical account of the Fall, of the Flood, of Moses and David, nay of the Birth, the Life, the Death of Christ were acted on the stage. What was it, that called forth these phenomena? It was not the poetic, but the religious interest in the subjects of these productions. We have overcome that period of imperfect development of true religious sentiment and poetical art. We acknowledge

\* Hallam Lit. of Eur., vol. IV. c. 5, s. 25. "It is difficult to enlarge or adorn such a story by fiction. Milton has done much in this way, yet he was partly restrained by the necessity of conforming to Scripture."

† Milton's *Paradise Lost*, v. 719.

"Son, thou in whom my glory I behold  
In full resplendence, heir of all my might;  
Nearly it now concerns us to be sure  
Of our omnipotence, and with what arms  
We mean to hold, what anciently we claim  
Of deity or empire: such a foe  
Is rising, who intends to erect his throne  
Equal to ours throughout the spacious north;  
Nor so content, hath in his thought to try  
In battle, what our power is, or our right.  
Let us advise, and to this hazard draw  
With speed what force is left, and all employ  
In our defence; lest unawares we lose  
This our high place, our sanctuary, our hill."

‡ This justification of the ways of God to man is, after all, not so much contained in the whole conduct of the poem, it is not practically exemplified by narrated events, but theoretically set forth in isolated passages, more especially in the speech of God to the Messiah, III. 80-134:—"Only begotten Son," &c.

that it was not correct taste, that produced mysteries and miracle plays, but an intense, though rude, not to say coarse, religiosity. We pardon the pious friars, who wrote their crude dramas to honour God in their way; we even respect them for their zeal, and we sympathise in some degree with their delighted and edified audiences; but we hold their productions to be false taste and a perversion of religion. We do not think, that these subjects are the best that could be selected, although they do possess a general interest. Mr. Hallam's theory therefore, it appears, does not apply to dramas. But is not the religious epic in its peculiar branch, what the miracle play is as a drama? What is the difference but this,—that the latter brings its persons before the bodily eye, whilst the epic paints them to our imagination?

The day of the miracle play is gone. It lingers, supported, and as it were sublimated, by the strains of music in our oratorios, where the words are overlooked and music alone fills the ear and the heart. The days of the sacred epic are numbered too. The time is coming, and we can discern its approach by unmistakeable signs,\* when the subject of "Paradise Lost," in spite of the general interest which it excites, and which has made it so popular, will be among the first and most powerful reasons to remove it from the table, and erase it from the imagination of the pious Christian.†

In venturing to pronounce this prophecy, I take my standing exclusively upon the above-mentioned ground, viz., the general unfitness of a sacred subject for epic poetry. But I am aware, that other secondary causes, allied to and partly derived from the main cause, tend to the same effect.‡ The mysteries of religion are dangerous ground. The

\* Hallam's *Lit. of Europe*, IV. 5, sec. 30 :—"Yet much that is ascribed to God, sometimes with the sanction of Scripture, sometimes without it, is not wholly pleasing, such as the 'Oath, that shook heaven's vast circumference,' and several other images of the same kind, which bring down the Deity in a manner not consonant to philosophical religion, however it may be borne out by the sensual analogies or mythic symbolism of oriental writing."

† Johnson's *Life of Milton*, p. 172 :—"Pleasure and terror are indeed the genuine sources of poetry: but poetical pleasure must be such as human imagination can at least conceive; and poetical terror such as human strength and fortitude may combat. The good and evil of eternity are too ponderous for the wings of wit; the mind sinks under them in passive helplessness, content with calm belief and humble adoration."

‡ Johnson's *Life of Milton*, p. 163 :—"Milton has been censured for the impiety, which sometimes breaks from Satan's mouth; for there are thoughts, which no observation of character can justify, because no good man would willingly permit them to pass, however transiently, through his own mind. *To make Satan speak as a rebel without any such expressions as might laint the readers imagination, was indeed one of the great difficulties in Milton's undertaking.*" This is a fault of the subject, not of the poet, and shows the truth of what we have advanced in the text.

poet cannot be vague and general in his opinions of the Deity. He must declare for one or the other dogma ; without well defined outlines and bold relief his figures would be lifeless shadows. Thus, Milton was unavoidably led by poetical necessity to Arianism. This cannot fail to repel a large number of readers, though so little prominence is given to that dogma, that before the discovery of Milton's treatise on Christian Doctrine, (in 1823,) perhaps few readers suspected its existence. In this rigid generation such heterodoxy as this cannot fail to operate powerfully against the continued popularity of the poem, and it is asserted, that already its sale has been impaired since that fatal discovery.

If Milton has tried to avoid shocking orthodox Christians by his Arianism, which the necessity of poetical anthropomorphism perhaps imperiously demanded, he was on the other hand led astray, (and again by the peculiarity of his subject,) to indulge his natural taste for dogmatic and controversial theology, by giving us his own views on the nature and attributes of spiritual beings, and to give to these views advisedly, and quite unnecessarily, a provoking distinctness. I will refer only to one instance—the elaborate demonstration that angels require food, (Par. Lost, V. 404.) mixed up with the crudest notions on physical science that could disfigure a noble poem (Par. Lost, V. 407):—

“ And food alike those pure  
 Intelligent substances require,  
 As doeth your rational ; and both contain  
 Within them every lower faculty  
 Of sense, whereby they hear, see, smell, touch, taste ;  
 Tasting concoct, digest, assimilate,  
 And corporeal to incorporeal turn.  
 For know, whatever was created, needs  
 To be sustained and fed ; of elements  
 The grosser feeds the purer, earth the sea,  
 Earth and the sea feed air, and air those fires  
 Ethereal, and as lowest first the Moon ;  
 Whence in her visage round those spots, unpurged  
 Vapours not yet into her substance turned.  
 Nor does the Moon no nourishment exhale  
 From her moist continent to higher orbs.  
 The Sun, that light imparts to all, receives  
 From all his alimantal recompense  
 In humid exhalations, and at even  
 Sups with the Ocean.—Though in Heaven the trees  
 Of life ambrosial fruitage bear, and vines  
 Yield nectar ; though from off the boughs each morn  
 We brush mellifluous dews, and find the ground  
 Covered with pearly grain : yet God hath here  
 Varied his bounty so with new delights,

As may compare with Heaven ; and to taste  
 Think not, I shall be nice. So down they sat  
 And to their viands fell, nor seemingly  
 The Angel, nor in mist, the common gloss  
 Of Theologians, but with keen despatch  
 Of real hunger and concoctive heat  
 To transubstantiate : what redounds, transpires  
 Through Spirits with ease ; nor wonder, if by fire  
 Of sooty coal the empiric alchemist  
 Can turn, or holds it possible to turn  
 Metals of drossiest ore to perfect gold."

The subject of "Paradise Lost" has been found to contain elements, that make it in some degree intractable material for an epic poem. Let us now examine, if this defect is perhaps compensated by an abundance of other qualities, which may deserve the high praise bestowed upon it by Mr. Hallam and other critics. This leads us to inquire, what are the qualities of a subject matter, or to use a technical term, a *fable*, which are the most favourable for the successful exercise of the epic poet's genius. The answer seems to be simple. The fable must abound in opportunities for exhibiting the moral, intellectual and physical qualities of men in their contact with one another, with nature and God in as great a variety as possible, and in such situations, as will create the sympathy of joy or sorrow in the reader's heart, and will tend to raise and ennoble his sentiments. The persons introduced by the epic poet must be varied to avoid monotony and dullness, they must be such, that we can put ourselves in their places ; their actions, their trials, misfortunes, or joys, must be akin to those which agitate our own hearts.

How are these postulates complied with by the fable of "Paradise Lost?" In the first place the agents are few in number, and this necessarily sets a limit to great variety. The Deity is not prominent, and perhaps too prominent, as it is. Then there are the angels, the fallen spirits, Adam and Eve ; five characters to fill up a poem of such length.\*

I anticipate and I shall answer the objection, that there are many angels, acting different parts, and demons likewise. This is true arithmetically, but not poetically. If we count up the seraphs and the various spirits of hell, who are mentioned by name,† or take a part in

\* If we reckon Sin, Death, Chaos, and Night, we obtain a few more actors ; but they are extraneous to the progress of the action ; they are not *dramatis personæ*, but symbolical decorations of the scenes. They will be spoken of below.

† The catalogue of the second book has this defect, that it contains many names which are not further referred to in the story. Homer's catalogue (Iliad, II. Book,) enumerates the heroes who really take a part in the war. But Milton's Satanic host only passes review in the second book. Few of them are even mentioned in the sixth ; for the rest of the poem they do not exist. Hallam's Lit. of Europe, IV. 3, 32.

the action, we shall indeed obtain a larger number of acting persons; but the characters of these spiritual agents are necessarily so devoid of individuality, that nothing attributed to any of them could not have been equally performed by any of the rest. It is the same person acting under different names. The archangel Raphael relates to Adam the fall of Lucifer; Michael draws the veil from future ages; Abdiel returns faithful from the rebellious spirits. What is there in the peculiarity of Raphael, that would make him less fit to relate the murder of Abel than the battle of the spiritual hosts, or to prove his fidelity to God like Abdiel; he cannot be thought either less prophetic or less faithful than his fellow angels. On the other hand—is not Satan the whole Satanic host? What are Beelzebub and Moloch and Belial in the Pandemoniac council, but the expression of some slight shade of thought? Their harangues might have been embodied in a lengthened monologue of Satan; there would be no inconsistency if the hesitation of Belial was put into the mouth of Satan as a momentary doubt.\* And granted that in the council there is a fundamental and irreconcilable difference of sentiment, is there not perfect uniformity of action? In the battle the exploits of one might as well have been ascribed to another, there is a variety of names but no variety of individual character.

What is the cause of this defect? Is the poet to blame or the subject? No doubt Milton might have varied the monotonous unanimity of hell by introducing discord, angry feelings, distrust, treason, mutual accusation and recrimination, and other varieties of evil passions among the followers of Satan. On the other hand he was debarred by the nature of his subject from making these beings really interesting to man by an admixture of virtues.†

\* Not so monologue-like is the debate in the council of the Greeks (*Iliad*, II. Book.) The parts of Agamemnon and Thersites are different in every respect.

† He has preferred representing them in perfect concord, (II. 496—"Devil with devil damned firm concord holds,") perhaps to preserve conformity with Scripture. To introduce a variety of other evil passions was very difficult. Milton hardly attempted it, and where he did, he failed.

This concord is no virtue, as Milton would have it appear, but conspiracy.—The poet says of Belial, II., 115:—

"His thoughts were low,  
To vice industrious, yet to nobler deeds  
Timorous and slothful."

What "noble deeds" can be attributed to a fallen angel? Not surely the war with the Almighty, which Belial dissuaded. Yet it would almost appear so, for (verse 227) he is said to have "counselled ignoble ease and peaceful sloth." We cannot justify the poet for calling the rebellion of the evil spirits a noble deed. It is a blemish of a different kind, though flowing from the same source, to make Mammon, (I. 679.)

"The least erected spirit that fell  
From Heaven; for e'en in Heaven his looks and thoughts

The shapes of the fallen angels are not discernible in the gloom of hell by the lurid gleam of those flames "from which no light but rather darkness visible serves only to discover sights of woe." But without light and shade no picture has roundness of form, or life-like plasticity. Unqualified and unrelieved depravity does not interest, it is not one of the things we feel to be real or possible; it is an abstraction and an idea, not a thing, that we can perfectly realise in truth.

It is a great mistake to say, that Satan appears in too favourable a light, and that he is the real hero of the poem. He has, in truth, no qualities, which are good in themselves, but only such, which may be sanctified by serving a good end, as fortitude, endurance, courage. Who can admire them, unless he admires the end for which they are called into play? The virtue of courage is the offspring of righteousness. It steals the sinews of the man who feels justice on his side; it forsakes him, who is inwardly conscious of wrong, and leaves him exposed to the irresistible strength and divine fortitude of justice and of truth.

As the fallen spirits are necessarily represented as totally alienated from God, and all that is acceptable in his sight, so on the other hand,

Were always downward bent, admiring more  
The riches of Heaven's pavement, trodden gold,  
Than aught divine or holy."

Milton was conscious of the dilemma, in which he was placed by the nature of his fable. On the one side he attributes to the fallen angels, on philosophical grounds, "semblance of worth, not substance," (I. 629); and on the other, he is, by aesthetic motives, compelled to admit (II. 432,) "that neither do the spirits damned lose all their virtue." As regards the poem, the latter admission is theoretical, the former practical; that is to say, the poet acts upon the former conviction throughout his work, and the latter thesis is inserted like a mental reservation, to keep open a back door in an argument. This element of contradiction is not confined to the just-mentioned case. It is found also in those passages which treat of *fate*. In all of them, with one exception, fate is represented like the *fatum* of the ancients, as a fixed all-ruling power, even beyond that of the Deity. This offensive doctrine cannot be considered as practically set aside in the poem, by that one passage, in which God says: "What I will, is fate." In a work of fiction we cannot proceed as systematically as in a scientific treatise. We cannot expect, that a definition given in one part of the work, should be rigidly applied everywhere. Persons and things must appear, what they are, from the mode in which they generally act and are spoken of; they must not require, that the true light should be thrown upon them only from one passage. Suppose that passage lost, everything else should remain discernible. To illustrate my meaning,—if Homer had wished to represent Penelope as a second Helen, it would have been nothing to the purpose, had he said in a line or two, that she was false to her husband. Our impression is the result of what we see her do; we could not form a different opinion of her even on the authority of the poet, unless he made her act differently. If we saw the name of Athens under a statue of Aphrodite, we should not be convinced that it was the Goddess of Arts, even should the sculptor himself have chiselled the letters. Thus, to return to the point, from which we started, the spirits of Milton's hell are thoroughly wicked, because they act willingly in direct opposition to God, nor can we invest them with any good qualities, although the poet may say, that they had some left.



the angels stand at the opposite extreme of unalloyed purity ; they are all lost to our vision in a dazzling brilliancy of resplendent light. They are without sin and even without weakness appreciable to us ; they are consequently all not only of one mould, but of one so super-human, that we look at their actions without ever venturing to identify ourselves with them ; they may command our admiration but they cannot gain human sympathy.\*

I come now to speak of the human beings which the fable of "Paradise Lost" furnishes. There are indeed two human beings, but alas, they are hardly human. Adam is not like one of ourselves ; he cannot feel and think and act as men do in human society. He is placed under conditions such as no other human being ever was since ; he is of his own kind, incapable of experiencing the thousand-fold variety of human feelings and passions to which his descendants owe so much of misery and of bliss. He has only Eve to associate with ; both are virtuous and happy ; they are provided with every want, they can gratify every wish, they know neither pain, nor denial, nor hostility, nor anything to make them truly moral agents ; there is but one fault that they can be guilty of. In the one act of disobedience is summed up their sinfulness. On this subject the remarks of Dr. Johnson are so just and concise, that I cannot do better than transcribe them, p. 166, "Such is the original formation of this poem, that as it admits no human manners till the fall, it can give little assistance to human conduct," p. 171, "The plan of 'Paradise Lost' has this inconvenience, that it comprises neither human actions nor human manners," p. 173, "The want of human interest is always felt."

What a difference is presented by the fables of the "Iliad" and the "Odyssey!" Gods and men in an infinite variety of age, of station, of sex, of rank, of power and influence ; from the majesty of Zeus, who shakes heaven and earth with the nod of his head, to the low scurrility of Irus the beggar parasite, and the petulance of Thersites the hunchback : what is there of human beauty or deformity, what of magnanimity or of vice, which does not furnish its vigorous colours to the adornment of those grandest and most truthful of pictures ? Here we

\* All that Johnson can say on this topic is this, (p. 163,) "Among the angels the virtue of Raphael is mild and placid, of easy condescension and free communication ; that of Michael is regal and lofty, and, as may seem, attentive to the dignity of his own nature. Abdiel and Gabriel appear occasionally and act as every incident requires. The solitary fidelity of Abdiel is very amiably painted." After descanting on Satan he says, (ibid) "The other chiefs of the celestial rebellion are very judiciously discriminated in the first and second books ; and the ferocious character of Moloch appears both in the battle and the council with exact consistency."

meet with the venerable Nestor, the fond eulogist of the past generation, and the youthful Achilles, the hope, not to be realised, of the future; the imperious sternness and implacability of Agamemnon; the cunning and daring of Odysseus; the heroic devotion of Hector; the conjugal fidelity of Penelope; the seductive charms of Helen; and Andromache's maternal tenderness, that breaks out into tears, when her foreboding spirit foresees the approaching orphanhood of the child at her bosom.

We cannot exhaust or even indicate the exuberance of forms which the fertile soil of the Homeric fables shoots forth, to display all the luxuriance of the richest colours, in the vivifying light of the poet's genius. When with the illusion of a lively imagination we have evoked before our eyes these gorgeous pictures, and suddenly turn to the sublime sameness, the grand and majestic monotony of the "Paradise Lost," we can fancy to realise the feelings with which the desert traveller returns to the dreary reality of a sandy waste, sublime though awful, from the momentary enchantment in which he had gazed upon the waving trees and glittering cupolas of a Fata Morgana.\*

The great superiority of the Homeric fables over that of the "Paradise Lost" is not confined to the greater variety of the material, and to the intensity of human interest, excited by it. As a religious epic, it was so far from giving offence to the pious feelings of many generations of Greeks, that it almost supplied the want of a sacred volume, and became, to a great extent, the highest authority in matters of religion. It was Homer, that inspired Phidias to the divine conception of his Olympic Zeus, and around this masterpiece of the combined genius of poet and sculptor it was, that, for ages and ages, the solemn assemblies of the scattered tribes of the Hellenes were gathered to celebrate their festive games, to sing their enraptured odes, and to display the whole of their gay religion, full of pomp, gold, and pride; it adorned the altar of the centre of the Greek religion, and that of the Greek brotherhood.

Such was the fable of the Homeric poems; and such the contrast of that of the "Paradise Lost." Without attempting totally to exhaust the subject, let us now proceed to inquire into the design, that is, the plan and structure of the poem.

The plan of the "Paradise Lost" is in all essentials that of the "Odyssey," and it has therefore all the merits and all the demerits of

\* Addison says, "The angels are indeed as much diversified in Milton, and distinguished by their proper parts, as the Gods are in Homer or Virgil." How could a classical scholar write this?

an imitation. It stands in this respect on a level with Virgil's "Aeneid." In both, we miss the vigour of originality, which imparts peculiar charms to Dante and to the Niebelungen.

The poet begins in the middle of his story, and brings up the beginning in the form of a narrative by one of the acting persons. The prophetic revelations of the fate of the human race, made by Michael to Adam, are framed after the visions which Odysseus and Aeneas are represented to have seen in the nether world. The prominence given to material battles is quite in the spirit and after the model of the antique, especially the "Iliad." There is little variety in respect of design. Once adopting the Greek style of Architecture, we have little choice and freedom. All the outlines and proportions of our structure are given with the fixedness almost of a natural law; we have only to accommodate it to our site, and we may indulge in a few slight modifications of detail. The general plan will not admit of much innovation. No modern architect has ever shown originality in the Greek style of ecclesiastical architecture, except where he has been led astray to the barbarous hybridism of a style half gothic, half Greek, vainly attempting to be original by combining incongruous elements. I have therefore, very little to say on this subject. It is true, the design of "Paradise Lost" is not original, but it is a successful reproduction of the chaste style of the unrivalled Ionic model.

Intimately connected with the enquiry into the design, is that into the management of detail and embellishments. This is for the parts, what the design is for the whole. And as in architecture the decorations and the arrangement of parts grow out of and are intimately connected with the general plan; so the plan of an epic poem is intimately connected with and essentially qualified by the tone and spirit with which persons and circumstances, events and actions, sentiments and natural agents are described. The imagery, allusions, illustrations, the whole poetical apparatus are of such importance, that their selection very much qualifies the judgment which is to be passed on the design, and on the whole poem. It seems sometimes part of the design, and inseparable from it, or hardly distinguishable, and therefore our inquiry into this part of "Paradise Lost" may be looked upon by those who like, as affecting the design.

It is a natural rule of Architecture, that the detail and the decoration of a building, should be in the character of the style. We have compared the design of the "Paradise Lost" to that of a Greek temple. But it is not sacred to a Greek deity; it is like a *christian* church conceived in, and devoted to the spirit of our sacred books. Then what

is the meaning of heathen gods and heroes filling the pediments and the metopes and the frieze? Is this demanded by the adopted style, or does not the object to which the building is devoted, demand different decorations? Nothing has been so generally blamed in Milton as his frequent allusions to Greek mythology, nor are these objections unfounded, as we shall presently see.

What is the rationale of these objections? It cannot be, that the Greek mythology is in itself devoid of beauty. Nobody ever found fault with Homer, or Pindar, or Aeschylus, for the ever charming forms of Olympic beauty, which they introduced into their poems. Nor is our *aesthetic* objection a puritanical aversion to images, or even to heathen gods. We justly admire a group of Venus and the Graces, if the sculptor's chisel has been inspired by true art. We hang up in our Museums the masterly productions of Rubens and Titian, even when they represent goddesses, and nymphs and satyrs. Why object to Chaos, or Saturn, or Mulciber in "Paradise Lost?" It is this, that these figures offend against the spirit of *truth*. We do not like to hear them spoken of as realities by a man, who, like ourselves, knows them to be fictions. Grave, and venerable and truth-loving to austerity as Milton must ever appear, there is in his employment of Greek mythology almost a dash of frivolity. The poet is playing with beings whom he professes to believe to be devils, but whom he really looks upon as poetical imagery, as mere productions of fancy. There is neither a poetical nor a religious conviction in the poet's mind of the reality of his mythological personages. They cannot inspire him, and they cannot of course gain the sympathy of his reader. They lack the reality of truth. They are artificial accompaniments in which we may admire skill and labour, but which cannot produce that never-failing effect of genuine poetical inspiration, wedded with truthfulness, which warms us with the poet's enthusiasm, and raises us, willing or unwilling, with him to the regions to which he soars.

It is truth, that is wanting in Milton's mythological persons; and this want makes us indifferent to them. In Homer they have the reality of life; the poet believes in them, and thus he can succeed in making us momentarily believe in their real existence, and to sympathise with whatever agitates their souls. The same effect cannot be produced by any modern author. The Greek mythology has ceased to inspire with that only true inspiration which is allied to truth and faith. It may furnish subjects for works of sculpture or painting, which never appeal to our heart and feelings like those of poetry. But even in these works it is a fatal error to mix up mythological figures with such as are true

and taken from life, to evoke the genius of victory to crown a dying hero, or to conjure up the muses to hold the medallion of a philosopher. In poetry the introduction of the unreal and untruthful is a more fatal error, and nowhere so much as in sacred poetry, in which religious objections are added to those which are merely æsthetical.

In the "Paradise Lost" Milton has so intimately interwoven the imagery of Greek mythology with the sacred texts, that offence was unavoidable. Jehovah is represented like a Jupiter Tonans, the thunder-bolt is his dreaded weapon; it gives him even the appellation of Thunderer (II. 28); it is the thunder of the Almighty, wielded by the Messiah, which decides the doubtful contest of angels and demons, and which helps to give to the poem so much of the character of a *Titano-machia*.\*

The Greek idea of Fate, as superior to the reigning gods of Olympus, has also an offensive prominence in the poem. It is hinted, and not by the devils alone, that there is some mysterious power, to whose decrees even God must bend, (II. 610, VI. 869, XI. 181.)

It is quite impossible to give here anything like a complete list of the reprehensible allusions to Greek mythology, of which the "Paradise Lost" is full. I must confine myself to a few examples, sufficient for illustration.

Heaven is a complete Olympus. The archangels dwell in separate palaces, erected as those of the Homeric gods, by Hephæstos, the divine architect, I. 732; and they are supported by nectar and ambrosia.

On the other hand, Hell is drawn like a perfect copy of Tartarus. There are in it—

- II. 575. "Four infernal rivers, that disgorge  
 Into the burning lake their baleful streams;  
 Abhorred *Styx*, the flood of deadly hate;  
 Sad *Acheron* of sorrow, black and deep;  
*Cocytus* named of lamentations loud,  
 Heard on the rueful stream; fierce *Phlegethon*  
 Whose waves of torrent fire inflame with rage.  
 Far off from these, a slow and silent stream,  
*Lethe*, the river of oblivion rolls  
 Her wat'ry labyrinth, whereof who drinks  
 Forthwith his former state and being forgets,  
 Forgets both joy and grief, pleasure and pain."
596. "Thither, by *harp-footed Furies*, hail'd  
 At certain revolutions, all the damned  
 Are brought," &c.

\*Of course Milton must have meant heavenly thunder, distinct from earthly. For the latter belongs to these terrestrial elements, which, according to v. 22<sup>n</sup>, the least of the angelic host can wield with ease.

604. " They ferry over this Lethean sound  
 Both to and fro, their sorrow to augment,  
 And wish and struggle, as they pass, to reach  
 The tempting stream, with one small drop to lose  
 In sweet forgetfulness all pain and woe,  
 All in one moment and so near the brink.  
 But *Fate* withstands, and to oppose the attempt  
*Medusa* with *Gorgonian* terror guards  
 The ford, and of itself the water flies  
 All taste of living wight, as once it fled  
 The lips of *Tantalus*."

It is here where—

625. " Nature breeds  
 Perverse all monstrous, all prodigious things;  
 Gorgons and Hydras, and Chimæras dire."

Frequent is the polytheistic allusion to *gods* in the plural number, which can only be explained from a familiarity with the term, caused by classical reading, and which at the present day is beginning to offend our feelings. Who will approve, that the poet says of the devils, "Their visages and stature as of gods," (I. 570) or that the archangel should be made to say, (VII. 329) "That earth now seemed like to heaven, a seat where gods might dwell;" or the following passage in the poet's mouth, (X. 90) "The speed of Gods time counts not, though with swiftest minutes winged." And yet the impropriety that lies in these passages is surpassed by Eve being represented like a Greek Aphrodite, (VIII. 59)—

" With goddess-like demeanour forth she went,  
 Not unattended; for on her as queen  
 A pomp of winning graces waited still."

Nor does Michael scruple to talk of goddesses to Adam, (XI. 614.) "For that fair female troop thou saw'st, that seemed of goddesses, so blithe, so smooth, so gay, (compare I. 558, II. 108.)

There was a period in German literature, when the gods and goddesses of Greece were constantly conjured up to fill the metre, or furnish a hollow phrase. Even Schiller is not free from this fault. He meant no harm in thus appealing to Venus or Bacchus. It was a mere form of speech, the fruit of that devout study of the antique poets, which often made the moderns live and think and speak in the forms of antiquity. But we have emerged from this tirocinium. We have done with these classical exotics. The flowers to adorn our poetry, we require, henceforth, to be native and genuine.

One of the worst, perhaps *the* worst instance of the adoption of

Greek mythological ideas, is that passage in the Second Book, in which the journey of Satan from hell to earth is described, (II. 951):—

“At length a universal hubbub wild,  
Of stunning sounds and voices all confused,  
Borne through the hollow dark, assaults his ear  
With loudest vehemence: Thither he plies,  
Undaunted to meet there whatever Power  
Or Spirit of the nethermost abyss  
Might in that noise reside, of whom to ask  
Which way the nearest coast of darkness lies  
Bordering on light; when straight behold the throne  
Of Chaos, and his dark pavilion spread  
Wide on the wasteful deep; with him enthroned  
Sat sable-vested Night, eldest of things,  
The consort of his reign; and by them stood  
Orcus and Ades, and the dreaded Name  
Of Demogorgon; Rumour next and Chance,  
And Tumult and Confusion all embroil'd,  
And Discord with a thousand various mouths.”

We meet here with real beings, that have a personal existence, independent as it seems of God, and hostile to him. Nothing could be more offensive in a philosophical and religious point of view, or more improbable and æsthetically misplaced, than the god Chaos, and the goddess Night enthroned in royal state and in sullen independence of the spiritual hierarchy, which the poet acknowledges in the remainder of his work. It is nothing less than the acknowledgment of the eternity of matter.\*

Less blameable perhaps, though more generally condemned, are the two allegorical conceptions of Sin and Death. It must be confessed by Milton's most ardent admirers that they cannot be defended: and I for one can not agree with Mr. Hallam, who “does not wish them away,” though he admits that “they will not bear exact criticism,” (*Lit. of Europe*, vol. IV. chap. V. s. 28.) Who can bear to see Satan represented like another Zeus, generating a being from his head, or as having carnal connexion with a woman? It is doubtful what is more offensive, the idea in itself, or the corruption and misplacement of the Homeric fable in the Christian epic. These and all the other mythological persons taken from the Greek Parnassus to adorn Christian poetry, remind me of the marble statues of Zeus or Apollo taken from their ancient altars, and with a few adaptations in emblems, or with new heads, placed in Christian churches to represent St. Peter or St. John.

\* Johnson, p. 175.

That the mythological decorations in the "Paradise Lost" are undeniable blemishes of that sublime poem, is, I believe, conceded on all sides. But various attempts have been made by the unqualified admirers of Milton to justify the poet, or at least to palliate his fault. It has been said, and with truth, that the fable of the "Paradise Lost" is too devoid of incidents and variety to be deprived of the imagery which the rich mythology of Greece affords.\* If this plea holds good, it is a very strong argument to prove my first position, viz. that the subject of the poem is far from being, as Mr. Hallam has said, "the finest that has ever been chosen for heroic poetry;" it is a defence of the poet's taste at the expense of his judgment; for his judgment should have led him to select a subject which would not compel him to offend against the rules of the highest poetic beauty which is inseparable from truth.† However, this defence is utterly futile. The employment of mythological allusions is quite independent of the subject of the "Paradise Lost." The Comus and Lycidas are quite as full of them.‡ The fact is, Milton's classical learning had communicated

\* Hallam, *Lit. of Europe*, vol. IV. ch. v. s. 32.

† I can hardly understand the serious meaning of a passage in R. Chambers's *Life of Milton*, *Cyclop. of Eng. Literature*, I. p. 331. "The theme of 'Paradise Lost' was in its nature connected with everything important in the circumstances of human history; and amidst these circumstances Milton saw that the fables of paganism were too important and poetical to be omitted."

‡ Even the Hymn on the Nativity, Milton's earliest production, written when he was still at college, is not free from these mythological allusions, though the subject is purely Christian and devotional. The long list of Heathen Gods that are there mentioned as being hurled from their altars, are endowed with the reality of life:—

"Apollo from his shrine  
Can no more divine

With hollow shriek, the steep of Delphos leaving."

"From haunted spring and dale,  
Edged with poplar pale,

The parting genius is with sighing sent

With flower-inwoven tresses torn,

The nymphs in twilight shade of tangled thickets mourn."

We have also Fate introduced —

"But wisest Fate says no, &c."

It may be pleaded, that Milton had a right to speak of the Heathen Gods as real beings, as in doing so he adopted the views of venerable Fathers. This is his justification for the same view taken in *Paradise Lost*. But independently of this we find a merely ornamental figure in the following lines:—

"Nature that heard such sound  
Beneath the hollow round

Of Cynthia's seat, the airy region thrilling.

Now was almost won, &c."



to all his thoughts and writings a peculiar colouring;\* he was unable to rise above the element into which he had plunged in early youth; though he aspired to "soar with no middle flight above the Aonian Mount," his wings were too heavy with the element of the Parnassian Hippocrene; he sought his Muse on Oreb or on Sion; but still it was a *muse* that he sought, the daughter of Zeus and Mnemosyne, who dwelt among the shady groves of Helicon or Parnassus, and sang in the Olympian courts the loves of goddesses and the valiant deeds of gods and heroes.†

We now approach the much-debated topic of the materiality of Milton's spiritual beings. Johnson was the first, as far as I know, to charge Milton with inconsistency on this ground. He makes the following remarks:—"Another inconvenience of Milton's design is, that it requires the description of what cannot be described, the agency of spirits. He saw, that immateriality supplied no images, and that he could not show angels acting but by instruments of action; he, therefore, invested them with form and matter. This being necessary, was, therefore, defensible; and he should have secured the consistency of his system by keeping immateriality out of sight, and enticing his reader to drop it from his thoughts. But he has unhappily perplexed his poetry with his philosophy. His infernal and celestial powers are sometimes pure spirit, and sometimes animated body," &c. (p. 174.)

An attempt has been made by Macaulay to defend Milton against Dr. Johnson's charge. He argues, like Milton himself and Johnson, that to describe the agency of spirits to the comprehension of man materiality was necessary. "Logicians," he says, "may reason about abstractions, but the great mass of men must have images. The strong tendency of the multitude in all ages and nations to idolatry can be explained on no other principle." Thus he justifies materialism. Good! "But," he continues, "Milton wrote in an age of philosophers and theologians. It was necessary therefore for him to abstain from

\* Macaulay (Milton p. 9) says, "He who in an enlightened and literary society aspires to be a great poet must first become a little child. He must take to pieces the whole web of his mind. He must unlearn much of that knowledge which has perhaps constituted hitherto his chief title to superiority. His very talents will be a hindrance to him." Let the reader judge now, if Milton did put aside all his classical lore to become a man instead of a scholar, and a poet by nature instead of a poet by books. See Johnson, 168, "Milton saw nature through the spectacle of books, and on most occasions calls learning to his assistance. The garden of Eden brings to his mind the vale of Enna, where Proserpine was gathering flowers. Satan makes his way through fighting elements like Argo," &c.

† Strange contradiction: that the muse should be invoked immediately after the gods of Doric Land had been declared to be embodied evil spirits, (I. 506)!

giving such a shock to their understandings, as might break the charm, which it was his object to throw over their imaginations." "It was impossible for the poet to adopt altogether the material or the immaterial system. He therefore took his stand on the debatable ground. He left the whole in ambiguity. He has, doubtless, by so doing, laid himself open to the charge of inconsistency. But, though philosophically in the wrong, we cannot but believe that he was poetically in the right." Such is (or was?) the opinion of Macaulay—no mean poet himself. I regret that I cannot agree with him. He has taken up a bad cause to plead for, and his arguments cannot mend his case. The truth is, they savour much of sophisms.

It is no use trying to reconcile things irreconcilable. A line cannot be straight and curved at the same time, nor can a being be corporeal and non-corporeal, or spiritual and non-spiritual. We are, as human beings, partly spiritual and partly corporeal, but we cannot drop either spirit or body as we please, nor can we realise the angels of Milton as gifted with that power. I am utterly unable to see what Milton has gained poetically by the sacrifice of philosophical consistency. It is true, that the enjoyment of poetry requires a certain degree of madness both in author and reader; but if there is not method in the madness, no enjoyment is possible; if our reason is constantly outraged or puzzled, we may be surprised or bewildered, but we can never be pleased.

I will not maintain, that it was possible for Milton, as Dr. Johnson thought, "to keep immateriality out of sight and to seduce the reader to drop it from his thought." Not only the philosophers and theologians of the seventeenth century, but no enlightened Christian public of any age or country, would allow any poet so much license on this point, as Homer could indulge in, availing himself to the full of the poetic elements of an anthropomorphic polytheism, much less possible was it to support a narrative by purely spiritual agents. The poet was in a dilemma, in which failure was unavoidable; he is therefore not responsible for this failure, except in so much as it was the consequence of his choice of subject. This choice once made, more on philosophical and religious, than on poetic grounds; the poet grappled boldly and struggled manfully with the formidable difficulties it presented; he had that spirit, characteristic of bold and haughty tempers, which challenges attack by working out a thesis to its most startling consequences. He was none of those who are afraid of the results of their own theories; he disdained to veil in mystic argument the asperities of his doctrines; he took particular pains in stating unmistakably what was his honest

conviction.\* We must honour his manliness, but we cannot but regret that it should have contributed to increase the disproportions between his genius and his permanent fame, which his unhappy choice of subject produces.

We have now in succession discussed the subject, the design and the poetical apparatus of the "Paradise Lost." It remains, that we should speak of the language, the materials as it were of the structure, of which we have examined the site, the style and the decorations. On setting out I looked upon this part of my enquiry as the principal one, but I have been tempted to enlarge so much on the remarks, which were intended at first to be merely introductory, that I am afraid I shall have to contract this topic into narrower bounds than at first projected. I shall be the more easily permitted to do so, as all grammatical and lexicographical remarks are naturally of a less coherent and continuous flow, and, necessitating a frequent reference to texts, are perhaps less adapted for a lecture like the present.

As to the remarks I am going to make, I can only claim the merit of systematisation and more detailed analysis. The broad facts have long been felt and stated correctly, nor could they have remained doubtful, as the peculiarity of Milton's language distinguishes him from every author that either preceded or followed him. Language is the material which the poet employs to embody his productions, and to bring them under our senses; it is to him what stone and metal are to the sculptor, canvass and colour to the painter. In proportion as his subject is elevated, his language must rise above the level of familiar parlance; it must help to produce in us that illusion, that forgetfulness of external circumstances and the realities of every day life, which is essential for the enjoyment of poetry. It is evident, that the sacred epic requires a diction, if less elevated than the ode, yet raised high above the tone of common conversation or narrative.

A powerful aid towards attaining this elevation is afforded by a dignified metre, such as necessarily excludes vulgarity. The ancient classical languages had in this respect a vast superiority over those of modern Europe, not even excluding the German. In the perfection of prosodic modulation they afforded material for the richest variety of metres, without being compelled to have recourse to the jingling of rhyme. The

\* I entirely disagree with Mr. Macaulay, who says, (p. 23):—"The peculiar art which he possessed of communicating his meaning circuitously through a long succession of associated ideas, and of intimating more than he expressed, enabled him to disguise those incongruities which he could not avoid."

heroic hexameter is never fatiguing, though thousands follow upon thousands. It is very unfortunate that this noble metre is inapplicable to the English language. English is too devoid of inflexionable short syllables to be able to furnish a succession of dactyls; it is too entirely under the dominion of accent, as distinct from prosody, to boast of many spondees; for it is the tendency of every accent to make the two adjacent syllables unaccentuated, i. e. short. Milton therefore chose the iambic blank verse, a metre which more than any other approaches prose, and is therefore peculiarly fitted for dramatic poetry. To counterbalance this disadvantage it was necessary to guard against a trivial flow of the verse by judicious distribution of the cæsuras, and on the other hand to fill the line with a diction as solemn and noble as could be commanded. Milton accordingly availed himself of all the artifices lawful in such a case; his chief object was to avoid triviality of expression, and in doing this he followed and cultivated a natural taste, of which he has given proof in all his works, prose and poetry, from his earliest compositions upwards. His natural austerity of thought led him to adopt that style of which Seneca says, "*Riget oratio; nihil in ea placidum, nihil lenè.*" It is allowed even by Addison "that it is often too much laboured, and sometimes obscured by old words, transpositions, and foreign idioms;" he pleads as an excuse, that Milton's sentiments and ideas were so wonderfully sublime, that it would have been impossible for him to have represented them in their full strength and beauty without having recourse to these foreign assistances. "Our language," he continues, "sunk under him, and was unequal to that greatness of soul which furnished him with such glorious conceptions."

Johnson (p. 179) is rather hard upon Milton in this respect: "The truth is," he says, "that both in prose and in verse, Milton had formed his style by a perverse and pedantic principle; he was desirous to use English words with a foreign idiom;" (p. 180.) "Of him may be said, what Johnson says of Spenser, that he wrote no language, but has formed a Babylonish dialect, in itself harsh and barbarous, but made by exalted genius and extensive learning the vehicle of so much instruction and so much pleasure, that like other lovers we find grace in its deformity."

This judgment on Milton's style, though severe, is in the main correct and just. I shall in the sequel endeavour to prove this in detail, confining myself to the "*Paradise Lost*," not because the peculiarity of style, of which I am about to speak, is to be met with in this poem alone, but because I must set limits to this enquiry, which has already extended too far. It might be proved, that the peculiarly Miltonian style was

formed by the poet in early youth, that it is found partly developed in his juvenile poems, and that even his prose is of the same colouring. It was the offspring of an austere mind impregnated with profound classical studies.

The most prominent feature in Milton's diction is the attempt to reproduce in English the grammatical structure of the classical languages, and above all Latin.\* Milton wrote good Latin verses himself, and, what cannot be said of many modern Latinists, a very respectable Latin prose. He thought in Latin. The gravity and stiffness of the Roman suited his character, he had nothing of the vivacity or brilliancy or originality of the Greek. His writings exhibit a most determined struggle with the smooth simplicity of the English idiom, which he endeavoured to raise to the dignity of Virgil's heroic lines, or to the sublimity of Horace's Lyrics, or to the rhetoric pomp of Cicero's long extended periods. How could he succeed in this unequal undertaking? *Magnis excidit ausis*. It was the same in his style as in his subject: he attempted things impossible. In the one he boldly undertook to represent the infinite and immaterial by means of the finite and of matter; in the other he sought to imitate the complexity of the Latin language, which abounds in inflexions, by means of the plain and simple English tongue, which is deprived of this flexibility by the almost total absence of grammatical terminations.

The crystalization of thought in English and in the two classical languages is essentially different. Ideas in English are arranged side by side in co-ordinate sentences; in Greek and Latin the sentences are strung together by the principal of subordination. In English the number of principal sentences prevails over that of secondary; in Latin it is the reverse: English sentences are short and simple; Latin sentences are long and complicated: in English the subjects, Predicate and Object, with their respective qualifications and attributes, stand in a regular order, which is seldom departed from. Latin abounds in inversions of all kinds, no part of a sentence has an exclusive right to any particular place. In the unadorned diary, which Cæsar kept in his campaigns in Gaul, we find a great number of sentences, which it is utterly impossible to render in English without breaking them up into smaller ones.† The more elaborate style of

\* And it may be added in Latin, of Horace, and in Horace of the Odes.

† Take, for example, IV. 30 —

"*Omnibus rebus cognitis principes Britanniam, qui post prælium factum ad ea, quæ jusserrat Cæsar, faciendâ convenerant inter se collocuti, quum equites et naves et frumentum Romanis deesse intelligerent, et paucitatem militum ex castrorum exiguitate cognoscerent, quæ hoc erant etiam angustia, quod sine impedimentis Cæsar legiones transportaverat, optimum*

**Livy** is still more replete with sentences of this kind, not to speak of the rhetorical periods of Cicero. Who would look for anything of the kind in an English Author? Yet Milton has among others the following sentence :

Speaking of Satan walking over the burning marl, the poet says :—

L. 299 "Nathless, he so endured, till on the beach  
Of that inflamed sea he stood and called  
His legions, Angel forms, who lay entranced  
Thick as autumnal leaves, that strew the brooks  
In Vallombrosa, where the Etrurian shades,  
High over-arched, imbower ; or scattered sedge  
Afloat, when with fierce winds Orion armed,  
Hath vexed the Red Sea coast, whose waves o'erthrew  
Busiris and his Memphian chivalry ;  
While, with perfidious hatred, they pursued  
The sojourners of Goshen, who beheld  
From the safe shore their floating carcasses  
And broken chariot wheels."

We have here not less than ten clauses connected together to form one period. How heavily this lumbering train is dragged along, must be felt at once by every one who has an ear for numbers. I think it will be difficult to find such another period in any English author but Milton.\* Let us take another example of the same endeavour at grandiloquence (VI. 307) : Michael and Satan prepare for single combat, when—

"From each hand with speed retired,  
Where erst was thickest fight, the angelic throng,  
And left large field, unsafe within the wind  
Of such commotion ; such as, to set forth  
Great things by small, if, nature's concord broke,  
Among the constellations war were sprung,  
Two planets, rushing from aspect malign  
Of fiercest opposition in mid sky,  
Should combat and their jarring spheres confound."

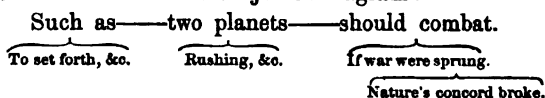
I defy any one to construe this passage at first reading. No wonder, that Bentley took in hand his pruning knife. "The context shows," says he, "that Milton gave it *warfare* instead of *war were*." "*Broke* and *sprung*," adds he, "are both participles of the ablative case ; a most frequent composition in Milton, which often makes his style obscure and difficult to those that know not Latin." The motive

*factu esse duxerunt, rebellione facta, frumento commeatuque nostros prohibere et rem in hiemem producere, quod his superatis aut reditu interclusis neminem postea belli inferendi causa in Britanniam transiturum confidebant.*

Here are 8 sentences and 5 participial phrases made up into one syntactical unity.

\* Bentley expunges the latter six lines, from "whose waves," on other grounds.

for Bentley's alteration is—as Pearce (in Newton's edition) surmises—this, that he missed a copulative particle between v. 312 and 313. But he merely shifts the difficulty to another place; for in his reading we miss the conjunction between v. 311 and 312, to join the two participles *broke* and *sprung*. Pearce, therefore, is for “keeping the old reading, and for allowing the poet the liberty of dropping the copulative before the words *two planets*, on account of that fire of imagination which was kindled, and height of that noble fury with which he was possessed.” It does not seem to me that the fire of poetic imagination is likely to sublimate away necessary particles: nor is it required in the present case to allow the poet any grammatical license. This construction is unimpeachably correct, but so wondrously stiff and complicated, so un-English, that it almost requires a foreigner to understand it. The framework of the sentence is as follows:—Such as—two planets—should combat. The predicate, *should combat*, is qualified by the adverbial clause, “*if among the constellations war were sprung*,” and this is again qualified by the ablative absolute, “*Nature's concord (being) broke*.” “*To set forth great things by small*” is a parenthetical phrase, which does not affect the structure of the sentence. The subject, “two planets,” is qualified by the participial phrase, “*rushing from aspect malign of fiercest opposition*.” The structure of the sentence is best seen from the subjoined diagram:—



I cannot explain the syntax of this sentence better than by giving a Latin translation of it; and surely nothing could more clearly prove the poet's tendency towards Latinisms:—“*Quales, ut magna parvis explicentur, si, disrupta naturæ concordia, bellum inter sidera ortum esset, duo planetæ corruentes ex adverso, configant in medio coelo, orbesque implicatos confundant.*” This sentence is grammatically correct, and it is evident that no conjunction is missing in it. The original is equally correct; but neither can lay claim either to perspicuity or to elegance.

The first ten lines of the poem form a sentence of this complicated nature, of seven parts, very artificially interlaced; but every schoolboy has become so familiar with it, that he no longer feels its strangeness of construction, and though not able to analyse it, almost guesses how the parts are joined together to form a whole.\*

\* Many readers, either from inability or indolence, indulge in a very bad habit of resting satisfied with having caught the general drift of a sentence, which they do, or think they

In the passage from the Sixth Book, (VI. 311,) we have met with an ablative absolute, "Nature's concord broke." This is rather a strange construction in a language which, like the English, has no ablative case. No wonder then that, as the learned editor says, this makes the style of Milton often obscure and difficult to those who know not Latin. There are numerous examples of an ablative absolute throughout the poem. I refer here only to a few:—

I. 604. "Cruel his eye, but cast  
Signs of remorse and passion to behold  
The fellows of his crime, the followers rather  
(Far other once beheld in bliss) condemned  
For ever now to have their lot in pain,  
Millions of spirits for his fault amerced  
Of Heav'n, and from eternal splendours flung  
For his revolt, yet faithful, how they stood,\*  
*Their glory withered.*

I. 392. First Moloch, horrid King, besmeared with blood,  
Of human sacrifice and parent's tears;  
Though for the noise of drums and timbrels loud,  
*Their children's cries unheard*, that passed through fire  
To his grim idol.

VI. 256. At his approach  
The great Archangel from his warlike toil  
Surceas'd, and glad, as hoping here to end  
Intestine war in Heav'n, *the arch foe subdued*,  
260. *Or captive dragged in chains*, with hostile frown  
And visage all inflamed, first thus began."

The difficulty of recognising at first sight the ablative absolute is two-fold. In the first place, the ablative is not distinguishable in form from the nominative; nor, secondly, the past participle in regular verbs from the imperfect tense. It may, therefore, happen to many readers, at first sight, to look upon *subdued* and *dragged*, in the last quoted passage, as imperfect tenses, which, of course, destroys the sense. The moral to be gathered from this fact is, that an ablative absolute should not be attempted in a language which has no ablative, and in which, moreover, the participle may often be mistaken for an imperfect tense.\*

We now come to another Latin construction, which Milton has

do, by putting together in the manner that seems most likely, the most prominent words, utterly heedless of syntactical laws. This kind of superficial reading cannot be checked better than by the careful study of the ancient classics and of the classical authors of English literature.

\* The sentence, "how they stood," as Richardson well remarks, is governed by the verb *behold*, six lines higher up.

\* This is no doubt the reason, why modern use requires in such cases the full form of the participle, viz. being subdued, being dragged.



attempted to naturalise—the accusative with the infinitive. This construction is quite familiar to us in such sentences as this, “We know him to be a good man.” But who would suspect to find it in the following lines :—

VI. 217.

“All Heaven

Resounded, and had Earth been then, all Earth  
Had to her centre shook. What wonder? when  
Millions of fierce encountering angels fought  
On either side, the least of whom could wield  
These elements, and arm him with the force  
Of all their regions :\* How much more of power  
Army against army numberless to raise,  
Dreadful combustion warring, and disturb,  
Though not destroy, their happy native seat.”

The construction of the whole sentence is clear enough, except the end—“How much more of power,” &c. But this latter portion is really obscure. Bentley says, “The construction is mutilous and defective,” and he suggests the alteration, “How much likelier then,” in v. 223. To me it seems that the subject of the sentence is expressed by an accusative with infinitive, “Army against army, to raise combustion and disturb their native seat;” this is equivalent to “the raising of combustion, &c., by armies numberless.” To this subject we must add, as predicate,—How much more of power, i.e., how much more grand and awful is that!† I confess this explanation hardly satisfies me, but it is the best I can give.

Another accusative with infinitive is IX. 965, “Adam, from whose dear side I boast me sprung.” The cast of thought is Homeric *οὐ παῖς εἶχουμαι εἶναι*. In form it is a Latin accusative with infinitive, in which the participle, without the auxiliary verb, performs the function of the infinitive,—“Adamus a cuius latere gloriōr me ortam.”

We have met with some attempts at an ablative absolute, which, as the English language is without the ablative, might be called nominative absolute. But Milton has attempted to accustom the English ear to the ablative also, in other combinations, for instance, to an ablative of

\* What are the *regions* of elements? Did the poet mean north, south, east, and west? or did he fancy regions of fire, air, water, and earth, arranged in strata, one above the other? Neither the one nor the other seems probable. Nor could the force of the elements be well called the force of their regions, when it is only exercised within these regions. I suspect, therefore that the text is here corrupted. The blind poet may have dictated *ragings*, which word the copyist took for *regions*. The notion of raging elements is familiar to Milton, conf. I. 176, II. 171, 213, 268, X. 286. The commentators, as usual, are silent where there is a *real* difficulty.

† As in Greek τὸ ἁμαρτὰ γεννᾷ ἀνθρώπους ὄντας οὐ θαυμαστόν: οἱ, οἳ πλεονταρχῆς στρατιᾷς τοιαύτας πολεμεῖσθαι.

quality (I. 285,) *etherial temper*, and to the ablative *temporis*, (I. 36,) *what time*. He seems to have longed for an ablative case in English, which would supersede the necessity of a preposition. Even in his prose he has such expressions as "Things worthier silence."

It is a peculiarity, and, to say the truth, a defect in the Latin language, that it hardly acknowledges the use of verbal substantives, i.e. substantives derived from verbs and expressing the action of the verb. The German forms a verbal substantive from every verb by the termination "ung;" e.g. "Erbauung, Eroberung." Equivalent to this is the English termination "ing," which looks like that of the participle present, but is in reality to be considered as quite different, e.g. the building, the taking. Such substantives being very rare in Latin, and even where they exist, being hardly agreeable to the Roman ear,\* it is usual to circumscribe such expressions, where they would occur, by the participle of the verb. The Roman, therefore, instead of saying "Two hundred years after the building of the city," says "Two hundred years after the city built:" *post urbem conditam*. This construction, which is not an improvement upon English, but the reverse, Milton has imitated, I. 373:—

" For never since created man  
Met such embodied force ;"

i.e. since the creation of man. And again, I. 635:—

" For me be witness all the host of heaven,  
If counsels different, or danger shunned  
By me have lost our hopes ;"

i.e. the difference of counsels and the shunning of dangers.

One of the greatest imperfections of the English language is the almost total absence of distinctive genders in substantives, and the consequent want of terminations. This not only contributes to deprive the language of the graceful undulation otherwise produced by the admixture of short terminational syllables, but it ties down the construction (i.e. the arrangement of words) to a stereotyped form, compelling us to sacrifice originality, variety, and vigour, to perspicuity. One of the consequences of this circumstance is, that the use of adjectives instead of substantives is considerably circumscribed. The Greek and the German languages have the greatest freedom in this respect. The Latin lacks the article, and is thus restrained

\* The Greek language delights and abounds in these words. This is an indication and a proof of the fundamental difference of the two nations. The Greek was inclined to generalize and form abstract ideas; observing towns built, he embodied the process in a word, building. The Roman only noticed the individual act: he formed no theory upon it, and no word to denote the process.



spirit of the English  
of good, but *much*  
I passage, VI. 223,  
to say "How much

the following line—  
itself."  
with the genitive, and  
of *what heavier*

brought from his  
relative pronoun,  
being, with its  
called its antecedent,  
of the governing  
pronoun, is some-  
apparently occupies  
antecedent would have  
ed, instead of *μεμνη-*  
kept very shy of  
Horace, Sat. I. 6, 15,  
e.g.—

ed,  
ed,"  
*ποβούνται*.  
I. 91. "Into what  
*πεντηκὸς ἐς ὅλον ὄρεϊ*

ed,"  
Munday's Essay on Milton—  
has contributed something  
has been achieved of merit."  
much attraction, but *only* to  
ed, V. 7.

It is not uncommon now to use the relative pronoun in comparisons, to say, e.g. "A man, than whom no greater lives." This is evidently an imitation of the Latin *quo* in similar constructions. I do not remember meeting with it in Shakspeare, nor do I think a plain spoken man would use it either in conversation or writing. There is something artificial and unnatural about it. The fact is, it was, if not first introduced, at least much favoured, by Milton, who has the following passages :—

V. 805. "Abdiel, than whom none with more zeal adored the Deity.

II. 299. "Which when Beelzebub perceived, than whom,  
Satan except, none higher sat."

A similar use of the relative pronoun is found—

I. 351. "A multitude like which the populous north  
Poured never from her frozen loins."

The "like which" is intended to represent the Latin "*qualem*."

The relative pronoun is of the greatest importance in the structure of Latin periods. Whoever knows how to handle it well, and to combine it skilfully with participles and the adversative, causative, and other particles, has the secret of a good Latin style. In English its use is very much more limited. It is only used in secondary, never in principal clauses. But this does not apply to Milton, who avails himself of it in a variety of ways in imitation of Latin, e.g. in the passage just quoted—

II. 299. "Which when Beelzebub perceived,"

is *quod quum B. animadvertet*. The Latin *quod quum* ought never to be translated by *which when*, but the Latin relative pronoun has to be changed in English into a demonstrative. Examples of principal sentences beginning with relative pronouns are numberless in Milton. I will quote a few :—

V. 371. "Whom thus the angelic virtue answered mild."

V. 385. "On whom the angel hail bestowed."

V. 404. "To whom the angel."

Turning now from pronouns to other parts of speech, we find a decided Latinism in the use of the superlative degree of adjectives, when no comparison is introduced, but the absolutely highest, or a very high quality, is attributed to an object, not the relatively highest. When we say "The wisest man," we think of one wiser than all the others. If we wish to attribute the quality *wise* in a very high degree, without making a comparison, we say "a very wise man," or "a most wise man," employing the indefinite article ; but Milton, when he says—

I. 409. "The wisest heart of Solomon he led by fraud,"

does not speak of one heart wiser than all the others of Solomon, he

means to express *sapientissimum Solomonis animum*. The same applies to II. 894—

"Where *eldest* night and chaos . . . hold eternal anarchy."

II. 535. "Before each van

Prick forth the airy knights, and couch

Their spears till *thickest* legions close."

II. 951. "At length a universal hubbub wild . . .

Assaults his ear with *loudest* vehemence."\*

I would hardly reckon among these passages the following :—

I. 251. "And thou, *profoundest* Hell, receive thy new possessor ;"

for as there are several Heavens, one above the other, so we may imagine several hells, into the lowest of which Satan was hurled.

It is a schoolboy rule, that two negatives make an affirmative. This applied to Latin is quite correct, but it is neither true of German nor of English. Where these languages are most unalloyed with classical phraseology, viz. in the pages of writers independent of the so-called revival of learning, and in the mouth of the common people, who retain in its greatest purity the genuine old character of a language, there, I say, we find two negatives to make not an affirmative, but simply to strengthen the negation.† It is, therefore, a Latinism when Milton says—

I. 325. "Nor did they *not* perceive the evil plight

In which they were, or the fierce pains *not* feel."

And V. 553. "Nor knew I *not*

To be both will and deed created free."

With respect to adverbs generally, it must be observed by the most superficial reader, that Milton studiously avoids, wherever he can, the adverbial termination *ly*, thereby likening his adverbs to adjectives—

E.g. II. 816. "And thus answered smooth."

This can hardly be called a Latinism or Græcism, for Milton has not confined himself to the cases in which the classical languages admit of the adjective to qualify the verb. The Greek and the Latin adjectives can be used either subjectively or objectively to qualify a verb where we should expect an adverb. Subjectively used, it is always in the gender of the subject of the clause, and it is looked upon as belonging rather to the subject than to the verb, e.g. *ἄκον ἀπῆλθε* we translate, "he went away unwillingly ;" but we should express the meaning quite satisfactorily by saying "he (being) unwilling went away." On the

\* L'Allegro I. "Hence loathed melancholy

Of Cerberus and blackest midnight born."

† The two negatives make logically an affirmative, and, therefore, are avoided by good writers. When I say they are genuine English, I do not pretend to maintain that they are good English.

other hand, when the adverb stands in the relation of object to the verb, being the result of the verbal action, it may be expressed in Greek and Latin by the adjective in the neuter gender, ἡδὺ ἐγέλαισε dulce ridebat, he smiled sweetly, i.e. the sweetness being the effect of the smiling. It is this use of the adjective, instead of the adverb, which Milton has especially introduced into his poem. But he has thereby sometimes made his meaning rather obscure, the inflexibility of the English language not furnishing him with a distinctive mark for the neuter gender, e.g.—

V. 783. "To whom the Son, with calm aspect and clear,  
Lightning Divine, ineffable, serene,  
Made answer."

To show the obscurity of this passage I will transcribe Dr. Newton's note:—"If lightning is a participle, the adjective *divine* is to be taken adverbially, as if it had been *lightning divinely*; but it is rather a substantive, and in Scripture the Angel's countenance is said to have been like lightning. Dan. x. 6, Matt. xxviii. 3." To such a dilemma the learned commentator is reduced. In my opinion he is altogether wrong. I fail to see the cogency of his argument. To compare the Messiah to lightning in this place seems highly improper; and what is serene and ineffable lightning? There can be no doubt, in my opinion, that Milton intended the three adjectives, *divine*, *ineffable*, *serene*, to qualify the participle *lightning*. But the mere possibility of Dr. Newton's mistake is a sufficient condemnation of the license taken by the poet.

In imitation of the use of the Latin infinitive perfect, where an infinitive present is expected, we find, that Milton has the following construction:—

VI. 19. "And found  
Already known what he for news had thought  
To have reported."

I. 38. "By whose aid aspiring,  
To set himself in glory above his peers,  
He trusted to have equalled the most High."

The intransitive verb, as is well known, is destitute of a passive voice. In Latin, however, the third person singular is formed, so that it is quite usual to say *venitur*, *ventum est*, &c. In English, however, to say "it has been come" would hardly pass current, I believe. Yet Milton, VI. 385, has the following passage:—

"Forthwith on all sides to his aid *was run*  
By angels many and strong."

It is difficult to introduce anything like a regular system into grammatical observations like the present, the more so, as I do not intend to exhaust the subject, and, therefore, should have to leave many dis-

agreeable blanks were I to adopt a strictly scientific classification. I must be content to string together remarks of a sometimes heterogeneous character, which would perhaps be better disposed of as notes to the text of the poet.

A considerable difficulty lies in the following lines :—

I. 105. "What, though the field be lost ?

All is not lost ; the unconquerable will

And study of revenge, immortal hate

And courage, never to submit or yield,

And what is else not to be overcome."

The last of these lines is generally looked upon as a question, and explained as a boast of Satan, who declares, that every other quality is liable to defeat, except the unconquerable will, study of revenge, immortal hate and courage, never to submit or yield. But I agree with Pierce, who rejects the sign of interrogation at the end of the last line, and explains it, *Et siquid sit aliud, quod superari nequeat*, if there be anything else, besides the particulars mentioned, which is not to be overcome. Bentley's stopping is quite unintelligible to me. He puts a comma after "else," a sign of interrogation after "overcome?" and begins "Not" with a capital.

I. 604-612. "Yet faithful how they stood."

i.e. yet to behold (605) how they stood faithful.

VI. 391.

"What stood, recoiled

O'er wearied through the faint Satanic host

Defensive scarce, or with pale fear surprised,

Then first with fear surprised and sense of pain

Fled ignominious."

Bentley says the sentence is inexplicable. He sees a contradiction in this expression, "What stood, fled," and asks, what is *THROUGH* the host? His remedy is, of course, a sweeping emendation. His first objection has been satisfactorily removed by Newton, who shows that "what stood" is said in opposition to that part of the Satanic host, which lay overturned, and it does not imply that they kept their ground, but merely that they kept on their feet. The second difficulty, which lies in *THROUGH*, has not been noticed by Newton, but it is greater than the other. Those who are related to have recoiled through the Satanic host, belong to that host themselves. It is impossible that the term Satanic host should apply to those only who lay overturned. The difficulty is removed by explaining the preposition *through*, as used for *throughout*, (as in I. 754.) This Latinism (*through* being merely a translation of *per*) is not uncommon with Milton :—

I. 875. "And various idols *through* the heathen world."

I. 518. "Or in Dodona, and *through* all the bounds of Doric land."



II. 464.

"While I abroad,

*Through all the coasts of dark destruction seek  
Deliverance for us all."*

Addison remarks, as a "little slip," the following passage :—

IV. 323. "Adam, the goodliest man of men since born

His sons ; the fairest of her daughters Eve."

Adam and Eve are here reckoned among their own descendants, of whom they are said to be the goodliest and the fairest. However, I would not call this a "slip." Milton was of no fault more free than of negligence. For every peculiarity he has his authority. Thus, in the quoted passage, he, no doubt, had in his mind a similiar construction found in the best Greek writers, e.g. in Thercyrides. (Bell. Pelop. I. 1. *ελαπίσας (τὸν πόλεμον) μέγαν τε ἕσσεσθαι καὶ ἀξυλογότατον τῶν προγεγενημένων.*

The same explanation applies to

II. 678. "God, and his Son except,

Created thing nought valued he nor shunned."

All the peculiarities of Milton's style, which I have touched upon, arise from his striving to elevate his style by adopting the more perfect grammatical structure of the classical languages, more especially of Latin. It is to these peculiarities, that I intend to confine myself in the present essay. If they are to be looked upon as blemishes or as ornaments, I leave others to judge. I am satisfied that they are not the result of inadvertency. In Milton this style had become a second nature. He could not write otherwise, even had he wished. It is an interesting question, in how far the habit of so-called literal translations from foreign languages tends to introduce foreign idioms into the mother tongue? A careful inquiry would show, that all modern European languages, and not only the Romance languages, owe a great portion of their grammatical structure to imitation, especially of Latin. I will not call this a wrong tendency, and, of course, I could not blame those men who first adopted a classical idiom, which afterwards became naturalised. But I have no hesitation in saying, that innovations of this kind, like political and social revolutions, are only legitimised by success. In so far, therefore, as a literary innovator has not succeeded in imprinting his peculiarity of diction on the national idiom, in so far does his failure deprive him of the meed of praise. The spirit of a language rejects what is uncongenial to it. An attempt to inoculate such heterogenous matter argues a fundamental error, a miscalculation of the powers and capacities of a language. The result is the effect of natural unerring laws. We must, therefore, abide by the decision, and whatever merit we attribute in other respects to Milton, for the vigour and loftiness of his diction, we cannot but say, that his tendency to

adopt classical idiom was very much in excess to the capability of the English language to receive them.

This opinion is corroborated by the thousands of lexicological classicism spread over the works of Milton. Many of these, it is true, have ceased to be strange. They have been assimilated in course of time to the rest of the English vocabulary ; for this process is far easier in isolated words than in grammatical constructions. Yet a great number of expressions are still so far un-English that only a classical scholar is able to understand them. For the sake of illustration I will select a few.

No passage is better known than the beginning of book III., which contains the beautiful address to light ; yet I am almost bold enough to say, that the expression in v. 7, "hearest thou," is not understood by one in a hundred of the general readers. No wonder ; as the verb *hear* is used in the sense of the Latin *audio*, which means sometimes *to be called*. The expression—

"Or hearest thou rather pure ethereal stream"—

is in fact an imitation of Horace's "*Matutine Pater, seu Iane libentius audis.*"

Who but a classical scholar can understand—

V. 19. "War he perceived, war *in procinct.*"

What reader would not think of quarrels in the following passage :—

VIII. 53. "And solve high *dispute*

With conjugal caresses."

*Solicit* is the Latin *sollicitare* in

VIII. 167. "*Solicit* not thy thoughts with matters hid."

*Memory* is the Latin *memoria* ; i.e. time remembered—

VII. 637. "And what before thy *memory* was done."

Compare farther—

X. 1101. "With tears

Watering the ground, and with their sighs the air  
*Frequenting.*"

VII. 323. "And bush with frizzled *hair* (ooma) *implicit* (implicita.)"

A longer enumeration of such isolated verbal peculiarities would be tedious. To use our poet's own Latinised expression—

I. 507. "The rest were *long* to tell."

They stand in the same relation to his diction, in which the Greek mythology stands to his biblical fable ; they are those dark spots in the moon's bright visage, "vapours, not yet into her substance turned ;" and as, after the lapse of almost 200 years, they are still unassimilated,

we may safely pronounce, that they have no better chance of finally disappearing than those lunar shadows.

To compare, in conclusion, the two greatest English poets, I would say, that Shakspeare represents the romantic, Milton the classical school of poetry. The one is essentially national, native, popular,—the other foreign, antique and learned. The one is like a Gothic structure, varied in plan and adorned with a thousand brilliant colours, and an endless variety of carvings of animated and inanimate beings—the other, like a Greek temple, simple and grand in outline, but scientifically correct in proportions and ornaments. Milton studied and reproduced the ancients, Shakspeare studied and painted nature. To understand and enjoy Milton, it is necessary to have a knowledge of classical antiquity, but Shakspeare will live and flourish as long as man has an open eye and a warm heart for all that is beautiful and good or great in the spiritual and physical world.

## NINTH MEETING.

ROYAL INSTITUTION.—February 20, 1854.

JOSEPH DICKINSON, M.D., F.L.S., &c., PRESIDENT, in the Chair.

The SECRETARY read a "Report of the Delegates from the four Learned Societies of Liverpool, which publish Transactions, on the subject of Union," when the President appointed Saturday, the 4th March next, at half-past Seven p.m., to take the subject into consideration.

The Rev. WILLIAM BANISTER, and Mr. GEORGE MELLY, were ballotted for, and duly elected Ordinary Members.

Mr. F. P. MARRAT exhibited specimens of Minerals, viz.: Arsenical Sulphuret of Cobalt, from Tunaberg, Sweden, and Sulphate of Lead, from Seven Churches, Wicklow.

The Rev. DR. HUME made some observations respecting the history and probable use of a number of flint hammer heads and axes, which were exhibited to the Society. He also mentioned the fact that Mr.

Mayer had offered to purchase the valuable Faussett Museum of Saxon Antiquities which had been offered to the Trustees of the British Museum for £680, but which they refused to purchase.

Mr. WILLIAM FERGUSON, F.L.S., F.G.S., &c., read a Paper

ON THE RAISED BEACHES OF THE FRITH OF CLYDE;  
WITH NOTICES OF THE DISCOVERY OF NUMEROUS  
ANCIENT CANOES IN THE NEIGHBOURHOOD OF  
GLASGOW.

THE more recent of the geological changes, which the surface of our earth has undergone, are not the least puzzling. There are evidences of changes and counter-changes, oscillations of the surface, elevation, depression, and elevation again, which are wondrously perplexing, and complicate the study of recent geology to a very great degree. Whether this arises from the greater number of the observed facts relating to this period, as compared with the older eras, or whether it is, that these recent periods have been subjected to a greater variety of disturbing influences than the others, it would be hard to determine. It is at any rate true, that much greater unanimity prevails among geological writers in their theories of the earlier deposits, their reconstructions of the aspects the earth presented during their continuance, and the circumstances under which their inhabitants existed and perished, than does with respect to almost all that comes within the range of the post tertiary division of the science. The veil has been lifted, with some apparent degree of truth, from off the various systems, which, one after another, have each been once "the present." We recognize a Silurian period, characterized by a profusion of zoophytes, shells, and cuttle fishes, with the latter of which probably the trilobite disputed pre-eminence, the whole system presenting us with but very meagre evidence of vertebrated inhabitants. The labours of Hugh Miller have restored the forms and habits of the families of mail-clad fishes which predominate in the old red sand-stone period; and the carboniferous system has once more, in imagination, waved its forests of palms and gigantic tree ferns and towering reeds before our delighted gaze. The lands and seas of the various groups which succeed have been re-peopled, and their terrible reptiles and mammoth quadrupeds have been portrayed. And all this has been done with a striking degree of unanimity, going far to vouch for the truthfulness of the conclusions arrived at. But the period of the drift, and the boulders, and the sea beaches, is still, in the extremest sense of the term, "Debateable land," and from

this very cause is not the least interesting portion of geologic science.

In the remarks which I have now the honour to submit to the Society, I do not propose to enter into any theoretical discussion, but merely to attempt a brief account of several appearances which the Frith of Clyde presents, and the analogues of which may be met with on this and every other coast.

In doing so, I cannot claim originality. Much of what I shall lay before you I have myself observed, but the subject has already been largely written on by such men as Mr. Smith, of Jordan-hill, Mr. Charles MacLaren, Mr. Robert Chambers, and many more. I am induced to make this communication, less perhaps by the hope that the local details of a district so far removed as the estuary of the Clyde is from that of the Mersey, will be interesting to you, as by a desire that the class of facts with which I shall have to deal should be brought under your notice, that your attention may thereby be directed as opportunity may offer to the observation and recording of the similar appearances which this neighbourhood also abundantly presents.

My attention was more particularly directed to this branch of geology by a circumstance, an account of which I had the honour of giving at the time to the Philosophical Society of Glasgow. Those acquainted with the topographical features of Glasgow, will remember that the town is built on a series of ridges of some eminence, running parallel, or nearly so, to the River Clyde, and that a slight hollow betwixt two of these, namely, Blytheswood Hill and the commencement of Garnet Hill, is occupied by Sauchiehall-street. In digging a drain in this street, in the summer of 1850, the workmen, after going down about four feet, came to a bed of pure peat, one foot thick, and below that they dug four feet through beds of sand, containing shells of the common species, "*Trochus Ziziphanus*." In prosecuting my inquiries, I soon found that the occurrence of shells at heights above the level of the sea, from 40 to 360 feet, was not at all uncommon in the valley of the Clyde.

Of a relative change in the level of the sea and land, denoted by this ancient beach in the heart of Glasgow, we have no want of corroborative proofs. Some of these I shall proceed to describe.

Commencing with the Island of Arran, we find there undeniable evidence of this alteration of level. The road from Brodick to Corrie, and so on round the north end of the Island, occupies a flat and level, but not broad, space of ground, a little elevated above the level of the sea, and backed by a series of cliffs of considerable height, and the vertical faces of which are water-worn and hollowed out into caves. The

cliffs are of sand-stone, belonging to a part of the Old Red Group, and the caves are due to the action of waves at one time beating against them.

Professor Ramsay, in his account of the Geology of Arran, says :—  
 “It will have been observed that an ancient sea-cliff overhangs the narrow plain intervening between the sea and the ascent of the hill to the north of Brodick. Between this cliff and the road, in what is now at many places ploughed fields, numerous recent shells, often in a perfect state of preservation, are mingled with the soil. The presence of these shells in such a locality, sufficiently indicates that what is now cultivated ground was formerly the sea-shore, which must, therefore, have been elevated to its present position above the tidal level, by subsequent upheaving agencies.”

I visited this place in the summer of 1849, and obtained from the sides of a ditch, in what was then a field waving with corn, many specimens of shells. They are broken and worn; but when it is remembered they were found at some distance from the sea, and at a much higher level than the sea ever reaches now, they are not without interest. From my note-book I copy the following account of my finding these shells :—“I had looked for the evidences of the ancient beach, all along, but as yet had not picked up any shells. When we had passed Port-Na-Claoch, and were still a mile or so north of Markland Point, I asked an old man who was working on the road, whether he had seen any, as now, from the profuse vegetation, I could see none. He said he had often ‘dug marl when he crofted a bit there,’ and bade me look behind the first rock, ‘which,’ he said, ‘keppet the shells when the tide gaed oot;’ ‘for,’ added he, ‘the sea has been ower a’ this, an’ up at the rocks yonder, for the auld road gaed aboon there.’ I did as he recommended, and in the first hollow, behind a mass of rock, at the edge of a corn-field, I found shells.”

A little farther up the Frith are the islands of the Greater and Lesser Cumbraes: the former well known from the favourite watering place of Millport, and the new Scotch Episcopalian College, situated on it. On the lesser Cumbrae, which is little more than a great rock, the same ancient beach is distinctly observable. On one end of this island, an old tower of extreme antiquity is built on the raised beach. Here, as in Arran, the beach is flat and narrow, very little raised above the present level of the sea, and immediately flanked by cliffs, rising abruptly from it. I have not landed on this beach, and do not know if it yields fossil evidence of its pristine character.

The Island of Bute presents us with the same physical conformation.

On entering the Bay of Rothesay, to the left, or south, you get a view almost equal to a section, the line of contour of the surface being presented against the sky and water, and representing a long slope from the hills to near the shore, when it descends abruptly to a flat space, not very broad, before reaching the water.

To the north of Rothesay, again, towards Port Bannatyne, the hills descend much more abruptly, but between their base and the water the little plain is more extended, and affords site for many bathing residences, and at one point it is occupied by a Roman Catholic Chapel.

Advancing up the Clyde, the same beach is seen on both sides. All along, from Gourrock southwards, the road is formed upon it. In some places it is a mere shelf, but in others it attains considerable breadth, and it is backed by most picturesque cavern-hollowed cliffs. These may be seen very distinctly in the neighbourhood of Wemyss Bay. On the north side of the Clyde, between Helensburgh and Dumbarton, the same sort of beach may be traced; and there, too, where the soft strata of the old red sand-stone stand out in cliffs, on the upper side of the road, they are hollowed out into water-formed caverns.

As you approach Glasgow, the high grounds on both sides of the river recede far inland, leaving spread out between them a rich alluvial plain, which it needs little imagination to recognise as the ancient bottom of some old sea inlet or inland lake; and it is curious to meet with names and notices carrying out this hypothesis. Thus, three or four miles below Glasgow, and a mile or a mile and a half north from the bank of the river, is a place called Garscadden. In Gaelic, I am informed, *gar* means a point, and *scadden* a herring; and Macfarlane, in his History of Renfrew, mentions this place as "The Herring Yair." There are also some notices in the statistical account of Renfrew of certain ancient fishings at Renfrew quay. In various parts of the flat grounds lying around that town, deposits containing shells of species not now living in our estuary have been found.

In and around Glasgow there are many indications of "terraces," with which, however, I do not think it needful to trouble you. They are carefully described by Mr. Robert Chambers in his "Ancient Sea-Margins." In addition to the evidence of the terraces themselves, we have authentic records of the discovery of shells in the clay and sand of which many of them are composed. Thus, at various points in the parishes of Paisley and Renfrew have shells been found, especially at Oakshaw and Bella Houston. They have been found at a considerable depth in some of the brick-fields at Annfield, to the east of Glasgow, by Mr. John Craig, and by the same person in various other places, at 40,

80, 100, and 360 feet above the sea level. Shells were discovered in cutting the canal between Glasgow and Paisley, at a distance of about four miles from Glasgow. Twenty-two species were obtained, and a notice of them by Captain Laskey appears in an early volume of the *Wernerian Transactions*. A series of shells are in the *Andersonian Museum of Glasgow*, procured from Dalmuir, on the Clyde, and a notice of their discovery, by Mr. Thomas Thomson, was inserted in the first volume of Thomson's "*General Records of Science*." Similar deposits are also described as occurring on the shores of Loch Lomond, and more recently at Airdrie. These latter discoveries have been recorded in the *Journals of the Geological Society*, by Mr. Smith, of Jordan Hill, to whom we are indebted for several papers on this subject.

I shall now leave *strict* geology for a little antiquarianism, and supply you with some proofs of the former existence of the sea, or at least of a branch of it, at the spot now occupied by Glasgow, in notices of the discovery of several canoes, embedded in sand at various places on the Clyde.

Up to November 1850, eight of these had been discovered. They have been kindly described for me by Mr. Buchanan, of the Western Bank.—

"The first was dug out of the foundations of the original church of St. Enoch, in 1780. It was lying flat, and filled with sand and shells. In the bottom there was sticking a celt or hatchet used by the aboriginal inhabitants. The boat was seen by the late John Wilsone, Esq., who secured possession of the celt; and it is now the property of his relative, Charles Wilsone Broun, Esq. It is in good preservation.

"The second was found about 1781, when digging the foundation of the Tontine. It is alluded to in Chapman's '*Picture of Glasgow*,' 3rd ed., p. 152. It was embedded in sand and gravel.

"The third was found in 1825, when opening London-street. The position of this boat was *vertical*; the prow being uppermost, as if it had sank stern foremost. It was also filled with sand and shells. Pieces of it were broken off by the curious, but no effort was made to disinter the boat and it was covered up again.

"A fourth boat was found in Stockwell, a little above Jackson-street, while cutting the common sewer along the former, in 1825. Not much is known about this boat, but it is alluded to in the '*Gentlemen's Magazine*' for 1825, vol. 95, part 2, p. 167.

"The other four were all found within a few yards of each other, in 1847-8, at Springfield, on the south side of Clyde, nearly opposite Mr.



Napier's dock. They were lying nearly seventeen feet below the surface, in the finely laminated sand.

"The first of this group is now in the Hall of the Society of Antiquaries, Edinburgh. The second, which is a remarkably fine specimen and nearly entire, is in Principal Macfarlane's garden, College, Glasgow. The third was much damaged by the work-people. It lay for some time in the court yard of the Clyde Trustees. One very curious fact may be remarked in connection with this boat. It had a plug of cork. Mr. Bremner, the Clyde River Engineer, drew it out himself, and gave it to me. There can be no doubt therefore of the identity. But where did the natives get *cork*, assuming that the deposition took place before the arrival of the Romans? I have had the question discussed in the Antiquarian Society, but without any satisfactory result. Spain being the nearest cork-growing country—and this boat belonging to the remote west side of the island—with many tribes intervening, in a state of constant hostility, there is a great difficulty in accounting for such a continental production as this cork plug being in possession of the rude Damnii, who inhabited this section of Scotland. The fourth Springfield canoe, is the smallest and seemingly the most primitive of the group. It is in the Museum of Anderson's University, Glasgow."

Shortly after a ninth canoe was exhumed. It is preserved in the Stirling Library, Glasgow. The discovery of two more was recorded in the "Northern Notes and Queries," in May, 1852, and in August of the same year three more were got, making fifteen in all. Two of those last discovered are by far the most interesting.

"The biggest is rather imposing." (I am quoting Mr. Buchanan again.) "From her considerable size, she was capable of containing a number of men, and, it is by no means improbable, was a war-canoe of the tribe. She is not at all crank, but broad and substantial; measuring fourteen feet in length, four feet one inch broad, and in depth one foot eleven inches. There are some curious details about this canoe worth recording. She is hollowed out of what must have been a most magnificent oak tree, an imposing specimen of the ancient monarchs of that primeval forest which then overshadowed all this part of the country. This gigantic tree has been very cleanly sawn through at the thickest place. Sharp tools must have been employed, for the interior is very smoothly cut, and the whole boat remarkably well executed. This canoe has a well shaped prow, not a mere cobble-like snout, as in other specimens; the stern has been cut open, and has the usual thin oaken board inserted in vertical grooves down the sides, and fixed in a horizontal one across the bottom, to keep it firm. This board remains quite

perfect ; the only instance, except one, among all those discovered in this district. But from the considerable width of this great canoe at the stern, the natives had probably not been able to get a board sufficiently broad to fill up the opening. The savage who fashioned the boat has overcome this difficulty in a very ingenious manner. Two boards have been inserted, and, at the centre where they meet, a vertical incision has been made in each edge all the way down, so as to form a sheath in which a thin slip of oak about an inch and a-half broad has been neatly introduced, and made to draw out when necessary. In this way the seam in the stern, caused by the meeting of the two boards, and through which water would have percolated, has been made completely water tight by the vertical wooden tongue fitting closely over it. There has been a seat across the middle of the canoe, the ends of which rested on two small projections inside left for the purpose on the gunwale when scooping out the boat. The natives have *rowed* this large canoe, instead of merely *paddling* her ; for two neat semi-circular knobs or elevations, each resembling a large horse shoe, with the concave facing the bow, have been left uncut on the floor at a convenient distance from the seat, for the rowers to rest their feet against, as a resistance to the pull of the oar. Towards the bow a large semi-circular aperture occurs in the bottom, which has been stopped by an oaken plug, as thick as a man's wrist and nearly a foot long. This plug was found sticking in the hole, and in order that it might not be lost it is perforated by a circular eye, to receive a thong for fastening it to the inside of the boat. It is not unlikely that this large aperture in the bottom was intended for the double purpose of running off, when on shore, the water shipped afloat, and of sinking the canoe when the savages wished to hide her, a practice quite common at the present day among the boatmen on the banks of the Nile. On both sides of this Clyde canoe, near the stern, are a number of well cut circular holes, irregularly placed, the use of which is not very obvious. A loose flat piece of wood about three feet long, also perforated by these circular holes and stopped with wooden plugs, was found inside the canoe, but its use is also doubtful. Altogether this is the finest specimen of the state of maritime art among our savage ancestors probably ever found in Scotland."

A local paper stated that in one of these canoes there were some remains of oakum. On this point, I requested particular information from Mr. Buchanan, and received from him the following interesting note :—

"I am quite satisfied that the Editor of the *Citizen* is mistaken in

stating that any indications of oakum were perceptible. The fact is, that nothing of the kind was *necessary*. Both canoes were hollowed out of single trees. Of what *use*, therefore, could oakum have been? Caulking was unnecessary. The stern of the largest is precisely the same as others I have seen, a moveable board; but *clay*, not oakum, has been applied at the only points through which water was at all likely to ooze. The other canoe has a closed stern.

"A more curious feature presented itself in regard to a third canoe of small dimensions, found within a few yards of the other two. *Underneath* this third boat was a small piece of *lead*, bearing the evident marks of iron nail heads, which had perforated it. The lead seems quite extraneous to the boat; but how it came there, or what purpose it served, is puzzling. There can be no doubt of the *fact*; for the person who found the lead gave it to me within a few hours after he got it, and had no earthly motive to misrepresent the matter. My opinion is, that the *lead* was *plunder* from some civilized people who may have visited even the remote shores of the estuary of the Clyde. We know the people of Tyre did visit Cornwall in search of *tin* and *lead*, thousands of years ago, and what is more likely than that they should follow up their exploration of the western side of the island, through the Irish sea? This, of course, is mere conjecture; and I throw out the idea as the best that at present occurs to me in the way of explanation, though I am not satisfied with it in my own mind."

The evidence afforded us by the embedding of these canoes, carries us back into a very remote antiquity. We must nevertheless clearly distinguish between this period and that during which the formation of the raised beaches was being accomplished. It requires no more for the embedding of the canoes, than that along the flat marshes of the Clyde there should have existed considerable swamps, lying very low, and subject to inundation every tide; and that this may have been the case during the last two thousand years is very probable. This would give us a considerable rise in the surface of the ground in those localities, but one less attributable to change from elevation than to causes similar to those which are now giving a yearly increase in surface on the Clyde between Helensburgh and Dumbarton, the deposit of large masses of detritus over the widened mouth of the estuary—in other words, the formation of a delta. And, that such a supposition is by no means too extreme, the alterations which have taken effect on the Clyde, within the period to which our annals refer, sufficiently attest.

But that the great geological changes in the relative levels of the

land and sea are carried back into an antiquity very much greater than the period to which authentic history reaches, is proved by the oldest civilized remains of which Scotland can boast—I mean those of the Romans. My purpose requires me to refer to only one of these, the site of the last co-terminating fort upon the Roman wall of Antoninus, or Graham's Dyke, as it is commonly called. This site is occupied by the ruins of a modern fortalice, Dunglass Castle, and has also been selected as the appropriate spot on which to erect an honorary tribute to Henry Bell, the first proprietor of steamboats on the Clyde.

You may be aware that "the first time the isthmus between the Clyde and the Forth was fortified by the Romans was in the year 81, while Titus, the conqueror of Jerusalem, was emperor. This was done by Agricola, during his fourth summer in Caledonia. He placed, however, merely a row of forts, without any connecting wall or curtain, having ulterior plans which were marred by the death of his patron Titus, and his recall by Domitian. The wall was constructed about sixty years afterwards, (answering to the year A.D. 140), by Julius Urbicus, the Governor of Britain under Antoninus Pius. The plan of this military fortification was a great trench, stretching from Clyde to Forth—at Dunglass rocky promontory on the former, to Cæriden on the latter, in line with and connecting the old forts of Agricola, but with a number of additional ones placed at intervals. The earth from the trench was thrown up into a rampart on the south side, and faced at some places with stone, at others with turf, and along the south ran a paved military way. The distance between the forts was generally two miles. It was not nearly so stupendous a work as the great wall of Hadrian, between the Solway and the Tyne, which was of stone."

I have now to notice that, "when both walls were built, they were erected with reference to a sea-level at either end, corresponding very nearly, if not entirely, with that at present existing in both the Scotch and English estuaries."—(Mr. Buchanan's letter to me.) If Dunglass was the site of the terminating fort on the Clyde estuary, its situation, almost on a line with the present surface of the water, affords a proof that the relative level of the sea is not lower now than it was in the year 140, or 1,710 years ago.

If, then, 2,000 years has seen such a slow rise as merely to convert a swamp into dry ground, almost without raising it at all, except where that has been done through artificial means adopted by man, how shall we calculate the epochs necessary for the formation of the numerous beaches found at so many various heights from the present sea-level

up to 360 feet? But this is not all. There are terraces covered by the sea. This introduces to us a new element in the computation, namely, that the movements have been downwards as well as upwards, and increases indefinitely the already almost inconceivable vastness of the time necessary for these processes; and yet this is but the modern period, and in reference to the preceding eras of geology, may be said to be but of yesterday.

In reference to this point, Mr. Smith, of Jordan Hill, has made the following remarks:—

“At an elevation of about forty feet, there has been observed upon many parts of our coasts a series of raised beaches and terraces, which, by their magnitude, indicate the prodigious length of time at which the sea-level must have been stationary at this height; and if we may judge of its duration by the relative size of the ancient terraces with those now forming, it must have exceeded the recent period, of which 2,000 years is but a part by an immense amount. But this is but one of the epochs in the history of this formation. Between the great terrace and the sea, several subordinate ones and beaches have been observed, each of them marking long continued periods of repose; whilst a sudden deepening, two or three fathoms below low water-mark, is probably caused by another line of terraces, now covered by the sea.”

The following table of the classification of the different formations of this, the pleistocene or glacial period of geology, is constructed from Mr. Smith's papers, and may help us to form an idea, or rather to lose ourselves in the attempt to form an idea of the extent of time necessary for its production.

1. Elevated marine beds. Ancient beaches.
2. Submarine forests.
3. Alluvial beds, most likely marine, but affording as yet no organic remains.
4. Upper Diluvium or Till. The most recent deposit of the Till. Has yielded bones of the fossil elephant, and water worn shells. “*Cyprina Islandica*,” “*A balanus*,” &c.
5. Marine beds in the Till, affording shells. Occurs at Airdrie 500 feet above the sea level. A bed of “*Tellina proxima*.” In site under No. 4, and above No. 6.
6. Lower Diluvium, Till, or Boulder Clay.
7. Stratified Alluvium, consisting of sands, gravels, and clays, without organic remains. Resting in the Clyde district, immediately upon the upper members of the carboniferous system.

I have divided the Diluvium or Till into two members, as certain recent discoveries, lately laid by Mr. Smith before the Geological Society, have shown it to have been deposited at two periods, with quiet waters intervening; and this also adds indefinitely to the already very extended length of time required for the development of these beds.

Perhaps we will not be far wrong if we conclude that there was once a time when the valley of the Clyde was an arm of the sea, and that its waters eddied around the various eminences which mark the physical geography of Glasgow. Far prior this must have been to the era when the receding waters left the lower reaches of the river, winding through low swampy plains, the broader lagoons and channels of which floated the canoe fleet of the aborigines, afterwards to be embedded on their reedy banks. Equally distant on the other hand must it have been from those still earlier days, when waters, whose bounds were full 500 feet higher than the present margin of the sea, supported the arctic "*Tellina proxima*," whose remains the Airdrie clays have yielded to modern researches.

What of the still more ancient epochs, when the luxuriant vegetation of the coal measures was waving on all the central strath of Scotland, from Forth to Clyde, hemmed in on either side by the dark red rocks of the old red sandstone, which had arisen at a still more remote date from the profound depths of ocean. And when those rugged crags of conglomerate, with their water-worn boulders, were strewed at the bottom of ocean, there was an older land. In the words of Playfair, "Revolutions still more remote appear in the distance of this extraordinary perspective. The mind seems to grow giddy with looking so far into the abyss of time; we become sensible how much farther reason may sometimes go than imagination can venture to follow." I feel constrained to repeat a remark which I have ventured before to make, that the indefiniteness of *time*, which geology requires, is only equalled by the indefiniteness of *space* which astronomy demands; and the twain only surpassed by the *infinity* of Him who fills them both with the evidence of His presence and His perfections.

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## EXTRAORDINARY MEETING.

ROYAL INSTITUTION.—March 4, 1854.

JOSEPH DICKINSON, M.D., F.L.S., &amp;c., PRESIDENT, in the Chair.

The SECRETARY read letters from the Rev. J. S. HOWSON and Mr. J. HARTNUP, expressing their inability to attend the Meeting, but approving of the principle of Union.

Upon the motion of Mr. J. BOULT, the "Report of the Delegates from the four Learned Societies of Liverpool, which publish Transactions, on the subject of Union," was considered as read to the Meeting.

The SECRETARY read the following communication from the Council, namely, "Provided the title Literary and Philosophical Society be retained, a union of the Learned Societies is desirable."

Moved by Dr. D. P. THOMSON, and seconded by Dr. W. IHNE :

"That the recommendation of the Council be adopted."

Amendment moved by Mr. E. HEATH, seconded by Mr. J. A. PICTON, and carried :

"That the words 'Provided the title of Literary and Philosophical Society be retained' be left out."

It was moved by Mr. ALFRED HIGGINSON, "That the Report be referred back to the Delegates for further consideration." This motion not having been seconded fell to the ground.

Moved by Mr. EDWARD HIGGIN, seconded by the Rev. H. HAMPTON, and carried :

"That the Report be adopted, with the exception of the clause, 'that the Committee think it premature to suggest a name for the enlarged Society; but they strongly recommend the avoidance of all the names of the uniting societies'—which is reserved for further consideration."

Moved by the Rev. Dr. HUME, seconded by Mr. J. FORSHAW, and unanimously carried :

"That the thanks of the Society be given to the Delegates; also to Mr. BRAKELL, for his liberality in printing gratuitously 1,000 copies of the Report of the Delegates."

It was moved by Mr. J. BOULT, seconded by Mr. T. SANSON, and carried :

“ That this Meeting be adjourned until Monday next, for the purpose of appointing Delegates.”

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### ADJOURNED EXTRAORDINARY MEETING.

ROYAL INSTITUTION.—March 6, 1854.

ROBERT McANDREW, Esq., F.R.S., VICE-PRESIDENT, in the Chair.

It was moved by Mr. JOSEPH BOULT, seconded by Mr. EDWARD HIGGIN, and carried unanimously :

“ That EDWARD HEATH, THOMAS SANSON, JOHN HARTNUP, J. P. G. SMITH, Esqrs., and Dr. W. IHNE, be re-elected as Delegates, in order to carry out further arrangements for the proposed Amalgamation with one or more of the other Learned Societies, and report thereon, with a sketch of amended laws.”

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### TENTH MEETING.

ROYAL INSTITUTION.—March 6, 1854.

ROBERT McANDREW, Esq., F.R.S., VICE-PRESIDENT, in the Chair.

The Rev. Dr. HUME announced that the valuable Collection of Saxon Antiquities, made by the late Bryan Faussett, had been purchased by Mr. Mayer.

Mr. FRANCIS ARCHER exhibited a Pebble Basalt, found at the Giant's Causeway.



Mr. SANSOM read extracts from a letter, received by him from Mr. RICHARD SPRUCE, dated San Carlos, del Rio Negro Venezuela, 27th August, 1853, detailing his progress in the investigation of the Botany of the Amazon, particularly as regards the Musci and Hepaticæ.

Mr. F. W. BLOXAM read a Paper

## ON THE MINOR POETS OF THE DAY.

After contending for an increasing taste for and love of Poetry at the present time, and its beneficial influence in civilizing and refining society, he took a rapid survey of what he deemed the distinctive phases of the minor Poetry of the earlier and later Stuart and Hanoverian reigns. Passing to the verses of our own times, he claimed for them a marked and special purpose in the illustration of social kindliness; in the correction of public and political errors and abuses; and in the aspiration for a purer, a juster, and a more satisfying era.

Adverting to the peculiar beauties and defects of the best American poets, Longfellow, Whittier, and Poe, he devoted the remainder of his Paper to a minute criticism of the works of those whom he considered the leading exemplars, or otherwise, of the modern English school, viz.: Tennyson, and his chief disciple, Elizabeth Barret Browning, Alexander Smith, Matthew Arnold, and others.

Alluding to Tennyson's great Poem, "In Memoriam," he animadverted upon the unfairness and want of discrimination with which it had been reviewed in certain high quarters, and contended that a due attention to the context would generally unlock his alleged obscurity of meaning and mysticism; the poetry of mysticism, however so much excepted against, he regarded as but a state of transition to a clearer atmosphere, agreeing with a modern eloquent writer, "That when the long passionate wail of Byronism had died away, there came an age whose motto was 'Work,'" but now, by degrees, we are beginning to feel that even work is not all our being needs, and therefore has been born what has been called the Poetry of Mysticism. For just as the reaction from the age of Formalism was the Poetry of Passion, so the reaction from the age of Science is the Poetry of Mysticism.

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## ELEVENTH MEETING.

ROYAL INSTITUTION.—March 20, 1854.

JOSEPH DICKINSON, M.D., F.L.S., &amp;c., PRESIDENT, in the Chair.

The SECRETARY announced that the Council had appointed Friday, the 31st March, at seven o'clock, to take into consideration, for the second time, the subject of the union of the learned societies.

Mr. THOMAS RIGGE was ballotted for, and duly elected an Ordinary Member.

Dr. W. IHNE compared Horace's "Ode to Pyrrha" with its translation into English by Milton.

The Rev. A. FISCHER read a paper on

## THE LIFE AND WRITINGS OF JOOST VAN VONDEL.

THE United Provinces of the Netherlands are known in this country chiefly in connection with the English revolution, and other political events, in which they played a prominent part; perhaps, also in connection with the celebrated artists of the Flemish schools; but little or nothing is known of their literature. In the absence of any information on the subject, it is thought that the Dutch, as a commercial people, have paid but little attention to letters. Far from this being the case, it may be shown that they have contributed more than their share to European literature; and, although principally devoted to mercantile pursuits, have nevertheless produced poets, dramatists, philologists, and philosophers, whose works may be placed among the best productions of ancient or modern times. It is indeed a remarkable fact that all commercial people have distinguished themselves by literary genius. The ancient Greeks were as active in commerce as they excelled in the arts; the English, though less imaginative than the Germans, have nevertheless excelled them in literature; for, as Goethe\* remarks, "German literature is chiefly the offspring of English literature." Even the Americans, a people of recent birth, have

\* Conversation with Ackermann, vol. I., p. 184.

produced some excellent poets. So also did the Dutch, at the time of their mercantile supremacy, excel in literature; whilst, with the decline of their commerce, their genius decayed. That their authors have obtained so little celebrity seems principally to be owing to their national language, which is hardly known beyond the borders of Holland. Those who composed their works in Latin have met with better success; and the names of Grotius, Erasmus, Buxtorf, and a host of others, have even obtained a world-wide reputation. There are, however, subjects which, being intended for the people, can be written in the national language only; such as the drama, epic, and satire. In this class of literature the Dutch have many productions not only of national interest, but of a literary significance also; especially those of their greatest poet Joost Van Vondel, whose life and writings form the more immediate subject of this paper.

Joost Van Vondel was born at Cologne in the sixteenth, and lived during the greater part of the seventeenth century. It was an era favourable to the development of genius,—an age of great men and of great events. The world, long pregnant with religious conflict and political disaffection, was giving birth to new ideas and new principles. Liberty of conscience was no more claimed as a favour, but as a right; and self-government began to encroach on the privileges of monarchs. The layman began to doubt the infallibility of his priest, and the subject the divine right of his king. The old system was effete, and new principles, long suppressed by antiquated authority, began with great violence to rush into existence. In England, king and law were contending for supremacy, and events were ripening on the continent which made the Emperor of Austria bow submissively to the king of a petty country; whilst in the Netherlands, the reaction of conquered tyranny was severely felt in the excesses of a violent democracy. Whether such events call forth great men, or whether the latter call forth those events, it is difficult to decide; but, seeing that at every emergency numbers of great men arise, it will not be hazardous to suppose that in troublous epochs, much genius is called into action which would otherwise have remained dormant. In ordinary times Cromwell might have remained the humble member of an obscure constituency, and Gustavus Adolphus unacknowledged "Majesty" among monarchs. Stirring events likewise call forth the power of the pen, and many an excellent composition we owe to the passing events of the day. So much is certain, that the political condition of his country called forth some of the best of Vondel's productions.

There was nothing, either in the position or in the education of our

poet, that would have justified anything but the most ordinary expectations. His parents, both natives of Antwerp, had been compelled to leave their country in consequence of the persecutions raging against the Reformed Church, of which they were sincere adherents. They removed to Cologne, and, in the year 1587, rejoiced in the birth of a son, who was afterwards acknowledged as the head of the Dutch poets. After a few years they were advised to emigrate to Holland, where every one enjoyed liberty of conscience; and, accordingly, Vondel established himself first at Utrecht, and afterwards in Amsterdam, where he carried on the trade of a hosier. As it is usual to trace genius to its infancy it may be as well to state that our poet showed in his boyhood a great love of poetry; but his first efforts were by no means successful. He himself seems to have been unconscious of his own talent, as on his marriage, in the year 1610, he entered into the same business as his father. It was then that an anxious desire for information began to manifest itself in him. Leaving his business to the care of his wife, he began to take lessons of an Englishman in the Latin language, and further improved himself under the tuition of a certain Abbama. He was soon able to read the Latin authors fluently; and in his writings gives frequent proofs of his familiarity with them. At a later period of his life, he furnished his country with an excellent translation of Virgil and Ovid. He was now thirty-three years of age, and had as yet produced nothing worthy of himself, when a serious illness threatened to put an end to his life; and so severe were his sufferings that he was often heard to wish for a speedy death. But, once restored to health, his former love of learning revived; and he joined a literary society, consisting of the most eminent literary men of his country, whose principal object it was to develope and refine their national tongue.

The United Provinces of the Netherlands were, at that time, passing through a most dangerous crisis, in the transition from a despotic to a constitutional government. They had been united during a long resistance to the Spanish dominion. No sacrifice of property, or even of life, was considered too much for the destruction of the common enemy, and for the maintenance of the national liberties. But when the enemy was subdued, the unsettled elements of the nation began to disturb the public peace. Every sect and every party contended for pre-eminence. There were at that time many men, who, by their patriotism obtained a great influence over the opinions of the senate, and of the people. William of Orange stands foremost among these; but there was one who, though playing a less conspicuous part, was not a less

useful man. Joan Van Oldenbarneveldt was a lawyer, distinguished by his wisdom, patriotism, and moderation. His services led the nation through the war of independence, supported them under the presidency of William, and guided them even when Maurice was the Stadtholder. Whether it was the consequence of faction, or, as some say, the envy of Prince Maurice, this grey-headed lawyer was accused of high treason, having, it was alleged, received from the Spanish government a bribe to betray his people. The accusation was false; yet, after forty years of services to his country, he was publicly beheaded, amid the savage applause of a licentious mob. The dread of popular displeasure silenced all censure, but the event was not lost to the mind of Vondel. Greatly incensed at these democratic excesses, he composed satires, in which he most bitterly inveighed against this atrocious act. These satires were not published till many years after they were composed. But, not satisfied with this, he undertook to place his sentiments before the public in the form of a drama; and as it would have been dangerous to expose himself to the fury of the people, he concealed the object of his drama under the colour of an ancient event. At a later period of his life he himself furnished annotations, showing who were the personages he had represented. The subject chosen for this purpose was the life of Palamedes, whose lamentable end is well known to the classical scholar. It is thus represented by Vondel. Palamedes, the son of Nauplius, king of Eubœa, had, by his wisdom, obtained such influence among the Greek princes that nothing was undertaken without his advice; and in the expedition against Troy he was unanimously appointed general and leader. When Ulysses feigned madness, and was ploughing the beach in order to avoid being called to take part in the expedition, Palamedes detected the cunning by laying his young son Telemachus before the plough. The father suddenly stopped fearing lest he should hurt his child. From that time Ulysses directed all his endeavours to effect the ruin of Palamedes, in which, he was joined by Agamemnon and Calchas, who had long since been jealous of his influence. They spread reports of treason, forged a letter in which Priam offered him a bribe; and Ulysses, having hidden some gold coins under his tent, which afterwards were brought forward as conclusive proof of his guilt, Palamedes was convicted of high treason and put to death. Many of the ancient authors lament his death. Virgil says—

Fando aliquod si forte tuas pervenit ad aures,  
 Belidæ nomen Palamedis et incluta fama  
 Gloria: quem falsa sub prodicione Pelasgi  
 Insontem infando indicio, quia bella vetabat  
 Demisere neci: nunc cassum lumine lugeat.

In the representation of living personages by ancient myths sufficient opportunity is afforded for satirical allusions. Happy as was the selection of Vondel in representing his hero's misfortune under the name of Palamedes, not less successful was he in the execution of the drama. There, perhaps, does not exist a drama so rich in satire. Shortly after the death of Prince Maurice this drama was published, and the object of the piece was soon discovered. The author was summoned to appear before the High Court at the Hague; but he concealed himself in the house of his sister, who so little sympathised with him, that she told him, "He had better attend to his shop instead of writing books." "Sister," said he, "I'll tell these people some more truths:" whereupon he composed some powerful satires, which, however, his sister succeeded in destroying. At that time every province in Holland was, as it were, an independent republic, and in conformity with their acknowledged right, the city of Amsterdam refused to give up Vondel, but fined him 300 florins (£25) for libel.

Palamedes, like all his dramas, is entirely on the ancient model. All the unities are observed, chorusses are introduced, and strophes and antistrophes inserted between the acts. It contains scenes equal to any of the Greek dramas, such as Palamedes before the council maintaining his innocence, the description of his last moments, and several others, in which his character remains always the same, calm, conscious of his innocence, and confident of the support of the gods.

Among the many dramas composed by Vondel, there is none so interesting to the English reader as his "Lucifer," the subject of which is thus described by the author. Lucifer, the chief of all angels, proud, ambitious, and selfish, envied God's unlimited power, and the excellence of man, who, being created in the image of God, governed in his paradise the whole of the earth. This envy was greatly increased when Gabriel, the herald of God, declared all the angels to be but the ministering spirits created to serve God, and to watch over man, and that a glorious future was reserved for Adam. He, therefore, endeavoured, through his agents, Belial and Beelzebub, to sow discontent among the angels, and, concealing his real intentions under the pretext of defending their rights, aroused numbers into open rebellion; and, notwithstanding the admonition and entreaties of Raphael, led on the rebellious host against Michael, the general of God. His object had been to become like unto God, and to shut out man from heaven; but his armies were defeated. Enraged at this defeat, he swore revenge,

and subsequently seduced man into disobedience against God, for which act he and all his hosts were plunged into hell, and doomed to everlasting perdition. The scene is in heaven. The characters are:—Beelzebub, Belial, and Apollyon, rebel chiefs; Gabriel, God's herald; Lucifer, the chief; Luciferists, rebellious angels; Michael, general; Raphael, guardian angel; and Uriel, Michael's armour-bearer.

It will be perceived from this brief outline that the contents of Vondel's "Lucifer" is identical with that of Milton's "Paradise Lost." Yet the former preceded the latter by fourteen years, which led some to suppose that it formed the basis of Milton's work. There are some grounds to justify such a conjecture. It is a notorious fact, that it was the original intention of Milton to execute his ideas in the form of a play, as Vondel had done; and, in comparing the two works, we discern a marked similarity in the speeches of the rebel angels. It is, moreover, worthy of remark that this is not the only subject on which both poets have treated; but that Vondel, as well as Milton, composed a drama on Sampson, both very similar in the execution. It is not improbable that the excitement caused in Amsterdam by the performance of "Lucifer" may have reached the ears of Milton, especially at a time when Holland and England came into frequent contact. If it be maintained that Milton, when he composed his poem, was not aware of the existence of such a work as "Lucifer"—as may not unreasonably be inferred from his introductory lines—we have to account in some other way for this coincidence, and this can only be in the circumstances of those times. At a time when law, right, and authority, were in continual collision, it is not improbable that the thinking patriots, unable to trace out the proper path, may have turned to the Bible for their guide, and may have found in the first history of man analagous circumstances in a higher sphere. It appears tolerably certain that such was the object of Vondel; and, as in "Palamedes," he may have concealed his political opinions under the guise of a celestial conflict. The rebellion of angels against their God, and the consequent ruin of man, is not an inappropriate representation of the opposition to law and authority so prevalent in his days, and the injury caused thereby to the innocent. If those same sentiments inspired Milton to compose his "Paradise Lost," his commentators may find another source of investigation, and draw from his poem his opinions on the grave questions that were agitated in his day.

Before entering on the relative merits of Vondel and Milton, I will read to you an extract from the first act of "Lucifer;" and, however imperfect my translation may be, it will nevertheless convey an idea of

our poet's style and genius. In this act, Apollyon having been sent by Lucifer to the earth, in order to furnish a strict account of Adam and of his happiness, returns, and, after a few introductory sentences, he is asked by—

**BEELZEBUB**—Tell us what thou beheld'st—we listen keenly.

**APOLLYON**— How I descended rapidly and sank,  
Sank through the ninefold sphyry Universe,  
Whose orbs illimitably sprinkled whirl  
Amid their glowing centres—will I not  
Dilate on, but your curious appetites  
Appease. The wheel of thought revolves less fast  
Than I beneath the moon and cope  
Terrestrial, like meteor did glide—  
There hung suspended on my ruffled feathers  
Gazing th' orient climate to discern.  
O favoured portion of a gorgeous whole !  
Round it salt oceans flow, in whose turmoil  
Huge scaly monsters flounder ! From afar  
Is visible a lofty mountain, whence  
A waterfall, the mother of four streams,  
Rushes towards the vale ! I steepily,  
With head inclined and pinions cowering,  
Drooped down and settled on the mountain's brow,  
From which I noted man's delightful home—  
The world below and all its loveliness.

**BEELZEBUB**—Describe to us that region and its form.

**APOLLYON**— Round, like the globe it forms the garden of,  
I' th' midst the mountain rises. Bursting thence  
In mighty torrents the pure crystal stream,  
Quadruply flowing, waters all the land—  
Meandering in a thousand foodful brooks  
As clear as light, their tiny beds thick sown  
With pearls and grains of gold and ruddy shells.  
Trees, plants, and flowers ambrosial deck the banks  
By river and by rill. The Onyxstone  
There sparkles, and the precious Bdeium glows  
In rich profusion. Little pebbly shores  
Breed starry gems in clusters and with foam,  
And e'en the very meadows seem to burn  
With veins of gold.

**BEELZEBUB**— What kind of atmosphere  
Floats where this new-wrought creature Man sustains  
The weight of empire ?

**APOLLYON**— Not a cherub fair  
Of our celestial host has sweeter breath  
Than the fresh spirit of health that revels there,  
Blessing and sweetening all. The pastures teem  
With many-coloured herblets, odorous buds,



Groves of thick leafiness, whose knobs and boughs  
 Weep spicey fragrance, and soft dews by night  
 Refreshingly descend. The regal sun  
 His measure knows, and tempers so his beams  
 To the nature of the soil that bud and blossom—  
 Berry and cluster, fruits of every pulp,  
 Kernel and juice enrich the land together.

BEELZEBUB—'Tis well ! Proceed most vigilant Apollyon !  
 Divulge more fully thy entreated thoughts.

APOLLYON— Who would prefer to be of spiritual  
 Rather than corporal frame, when we behold  
 Beings of flesh and blood, of bone and sinew,  
 Created from the dust to equal us—  
 Nay, haply, to excel us—for beneath  
 Their proud authority all creatures stand  
 That people Adam's realm. I hovered near  
 While animals in throngs and flocks and shoals  
 By thousands upon thousands—all who tread  
 The solid ground or wing the limpid air,  
 Or with gilt flashing fins divide the stream,  
 Each born for its peculiar element—  
 Worshipped before him ! Who, like Adam, could  
 Discern their characters and qualities  
 Omniscient ? For he gave them all their names—  
 Names, as thou wilt observe, of each conveying  
 The properties—a depth of wisdom which  
 Omniscience alone could have inspired !  
 The lion of the mountain crouched to him  
 Roaring subduedly. The tiger lay  
 Submissive at his feet. The sturdy ram  
 Lowered his horns ; the elephant his trunk  
 Wreathed reverently. Snake and mailed dragon  
 Did homage to him, bear and griffin came  
 In meekness to their master. Insect swarms,  
 The princely eagle and each bird that flies,  
 The whale and every fish acknowledge him—  
 Behemoth and leviathan upreared  
 Their vastness from the waters and adored him.  
 I dwell not on what praise is sung to man,  
 What warblings greet him from the roseate bowers  
 And nooks of dusky verdure, while the wind  
 Plays in the copse, runs o'er the mellow stream,  
 And fills the unsated ear with music. Had  
 Apollyon's mission been achieved, he would  
 Have soon forgotten Heav'n in Man's Elysium.

BEELIAL— What think'st thou of the amorous pair to whom  
 All this felicity is consecrate ?

APOLLYON— Of all the white-robed choir, no Seraph yet  
 Has more entranced my gaze than Eve and Adam,

The blessed pair who roam in flow'ry Eden !  
 Who save the great Omnipotent could frame  
 Two beings thus sublimely interfused !  
 Body, with living spirit—two-fold angels.  
 The body, beautiful in shape and power,  
 Proves the Creator's skill most pregnant in  
 The god-like face, the mirror of the mind.  
 I saw the reflex of the human soul  
 Blaze from his countenance. Whatever lovely  
 The body can possess—etherealised,  
 There sparkles with intense effulgence bright.  
 Divinity gives radiance to man's eyes,  
 The rational soul his bosom makes her throne.  
 And while his subjects to the turfy sod  
 Gaze dumbly, man alone  
 Rears proudly his superior head towards  
 His high Creator—breathing hymns of praise.

**BEELZEBUB**—Good cause to praise him for such bounteous gifts !

**APOLLYON**— He governs like a God whom all must serve.  
 The viewless soul consists of spirit, not  
 Material substance. She, complete and strong,  
 Reigns in each member, makes the brain her court,  
 Lives for eternity, and never fears  
 Decay or injury. Knowledge and prudence,  
 Freewill and virtue, form her heritage :  
 Her majesty all ranks of spirit must  
 Confess.

**BELIAL**— Still thou namest not  
 His rib—his beauteous bride.

**APOLLYON**— I hid my face,  
 Veiling, with trembling wings, these ravished eyes  
 When I beheld her. Adam led her on  
 Through a green forest. Often would he pause  
 To gaze upon her. Then a holy flame  
 Enkindling his pure bosom, he would melt  
 In joy and kiss his wife, and she her husband,  
 With fires of love no language can express—  
 Felicity which angels cannot compass.  
 How poor is unity ! Alas, we are wrong'd—  
 For what is Heav'n without the grace of woman !

**BEELZEBUB**—Thus will in flux of time's unebbing sea,  
 Millions of men arise.

**APOLLYON**— Even so ordains  
 Th' eternal fiat ! By a sense divine,  
 A vivid impress of the beautiful,  
 Implanted in the brain and vital tissues,  
 Flooding all passions, feelings, hopes, and fears,  
 In transports exquisite these lovers are

Endeared. Their life is love, and still they love,  
And love again with bliss reciprocal,  
Assuaged alternately, yet never quelled.

BEEZEBUB—Depict to me completely this fair bride.

APOLLYON— O mighty peer ! this would demand a touch  
Of Nature's pencil : no extrinsic colours  
But living, quickening sunbeams. Man and wife,  
Of stature full, in every graceful charm  
Perfect, of equal comeliness appear.  
Yet Adam far excels in bulk and strength  
And majesty of countenance, as one  
Elected to the sovereignty of earth.  
But the Creator has in Eve combined  
All the full heart of Adam can desire—  
Delicate limbs, a smoother skin, and flesh  
Of tints more beauteous than the seraph's wing ;  
Rosy and snowy lips of thrilling bliss,  
Eyes beaming with affectionate desire,  
Two ivory rows voluptuous, and a voice  
Melodious as the utterings of our harps  
When breezes heavenly sweep their golden strings.  
Beauty unparellel'd ! for which a spirit  
Might gladly forfeit immortality !

BELIAL— Methinks this woman has in thee enkindled  
A flame of passion.

APOLLYON— I have singed my wings  
In that delightful fire. Most difficult  
I felt it to arise—  
And steer towards our holy habitation ;  
Yet I arose, but painfully, and thrice  
Turned back my earnest gaze. Nothing like Eve  
Shall e'er solace these eyes. O, joy divine,  
To watch her steps ! A beamy tissue of light  
Plays in her golden hair, which floats in waves  
Adown her snowy shoulders ! So she moves  
As in a halo of entrancing pleasure,  
Rejoicing all creation with her smiles !"

This extract will perhaps suffice to convey an idea of our Poet's genius. The Foreign Quarterly Review of April 1829, in reviewing a book on Flemish Literature, alludes but cursorily to Vondel, and after stating that when compared with Milton he proves very inferior, he proceeds to the next topic. In the weekly periodical "Notes and Queries" of December 29th, 1849, a correspondent inquires whether the tragedy or dramatic poem "Lucifer" has ever been translated. He proceeds to say that the French writer, Alfred de Vigny, in his "Stella," calls Vondel "Ce vieux Shakespeare de la Hollande." In reply to this query

we find in the following number of that paper, that if it has not been translated it is not worth translating; and to prove his assertion he does not give any extracts from the work, but mentions the *dramatis personæ*, which, he says, speak for themselves. But turning from these critics to one who seems to have really perused his works, I find in the Penny Cyclopædia the following remarks: "Never has poetic genius displayed itself more forcibly or with greater sublimity, than it has in all his best productions. He was one of those superior spirits who give celebrity to their country and to their age; and if Camoens singly has sufficed for the literary glory of Portugal, Vondel alone would have been sufficient to confer fame upon his country." (Art. Netherlands.)

A comparison between Milton and Vondel would be a very interesting task. The former would no doubt prove superior, but the latter will be found a worthy competitor in the same field of literature. Allowance must be made for the disadvantage under which a dramatist labours; for unless we see the drama represented on the stage it is no more than a skeleton, whilst an epic poem describes all the *minutiæ*, and is therefore more striking to the reader. An epic poem has moreover a wider scope for the display of the imagination, which can picture to the mind more mysteries than the stage can represent. When "Lucifer" was first introduced on the stage it was suppressed as a subject unfit for representation. But being published, no less than a thousand copies were sold in a few days,—an immense success considering the extent of the country, and the age in which it was written.\*

The limits to which this Paper is confined compel me to hasten to a conclusion, without noticing any of the other works of Vondel. In the year 1625, he sank into the most desponding melancholy, which rendered him incapable of any exertion. When recovered, he composed, among other poems, his "Hanekot," in which his hero is a certain preacher who had been ejected by the synod. In all his poems of this kind he writes with great severity against the clergy for interfering in civil matters. He was once heard to say of the clergy, that "Whenever he got hold of them he felt quite inspired." In the year 1628 he went to Denmark to collect some debts, thence to Sweden, and at Guttenburg he composed a poem called the "Oracle," in which he foretold that Gus-

\* Among the "Chester Plays" there is one called "The Fall of Lucifer." The editor remarks—"The legendary story of the fall of Lucifer appears to have been exceedingly popular in the west from the earliest ages of Christianity in these parts. Milton, perhaps, founded some of his most magnificent pictures on the rude ground-work of these mysteries."

tavus Adolphus would carry on war against the Roman Catholic Faith, and subdue the Austrians. This prediction was actually fulfilled a few years afterwards. In the year 1630 he composed many satires, all directed against the clergy and the government. A few years after, he began to compose an epic poem on Constantine the Great, which was to be complete in twelve books, but the death of his wife made him indifferent to its completion, and he destroyed it.

In the year 1640 his religious opinions underwent a great change, and he embraced the Roman Catholic faith, which henceforth he vigorously defended, notwithstanding the personal sacrifices he had to undergo. It is, perhaps, this religious apostacy that induced him to compose a drama on Mary Stuart, in which he represents her as innocent of all the crimes imputed to her, while Elizabeth is described as a second Herodias. For this he was fined 180 florins (£15).

When 70 years of age he was in great distress, and, therefore, accepted a situation in the Lombard or Pawn Office, which, in that country, is a government institution, at a salary of 650 florins (£54) a year. But instead of writing tickets he made poems, and government was obliged to discharge him, but did not withdraw his stipend. The remainder of his life he passed in great seclusion, and died in the year 1679, at the advanced age of ninety-one years. His works are very numerous. They consist of dramas, epic poems, satires, odes—in fact of almost every possible kind of poetical composition. After his death his works gradually rose in public estimation; and although his fame has scarcely reached beyond the frontiers of his country, there is no doubt that a correct translation of his works would obtain for him a place among the master minds of ancient and modern days.

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## EXTRAORDINARY MEETING.

ROYAL INSTITUTION.—March 31, 1854.

JOSEPH DICKINSON, M.D., F.L.S., &amp;c., PRESIDENT, in the Chair.

It was moved by Mr. HEATH, and seconded by Mr. PICTON—

“That the ‘Report of the Delegates, from the four Learned Societies which publish Transactions, on the subject of Union,’ be adopted, with the exception of the clause, ‘The committee think it premature to suggest a name for the enlarged society; but they strongly recommend the avoidance of all the names of the uniting societies, which is reserved for further consideration.’”

Amendment moved by Mr. J. B. Yates, and seconded by Mr. W. RATHBONE—

“That the Literary and Philosophical Society will have great pleasure in receiving the Historic Society of Lancashire and Cheshire upon the same terms on which it received the Natural History Society ten years ago, but that the Literary and Philosophical Society cannot consent to an alteration of the name under which it has heretofore worked well, and which appears perfectly adapted to the objects aimed at by the Society.”

The amendment was put from the chair, when there were—*for*, twenty-three votes; *against*, twenty-six. The original motion was then put and carried, there being votes—*for*, twenty-eight; *against*, eleven.

It was moved by Dr. INMAN, seconded by Dr. HUME, and carried unanimously—

“That Edward Heath, Thomas Sansom, John Hartnup, and J. P. G. Smith, Esqrs.; Dr. W. Ihne, Dr. Dickinson, J. B. Yates, Esq., Dr. Inman, Robert M'Andrew, Esq., and Dr. Thomson, be elected as delegates, in order to carry out further arrangements for the proposed amalgamation with one or more of the other learned societies, and report thereon, with a sketch of amended laws.”

## TWELFTH MEETING.

ROYAL INSTITUTION.—April 3, 1854.

ROBERT M'ANDREW, Esq., F.R.S., F.L.S., &c., VICE-PRESIDENT,  
in the Chair.

Mr. CHARLES GREY MOTT was ballotted for, and duly elected an Ordinary Member.

Resignations were received from Mr. R. LOWNDES and Mr. C. C. CHAMBERS.

Mr. J. P. G. SMITH exhibited specimens of *Lapis Lazuli*, from South America ; also Photographs of Snow Crystals.

Mr. R. M'ANDREW, F.R.S., called attention to the works of several Spanish poets of the 16th century, and alluded to the construction of their productions.

Mr. F. W. BLOXHAM exhibited a copy of the 5th edition of Milton's *Paradise Lost*, which was published by Jacob Tonson.

Mr. THOMAS SANSOM exhibited a manuscript copy of the "Queen's Matrimonial Ladder," being a series of caricatures of George the Fourth.

Mr. FRANCIS ARCHER exhibited specimens of Corundum, from Carrick Fell, Cumberland.

Mr. J. JONES exhibited several ancient coins, some of Greek origin, recently dug up in the Punjaub.

The Rev. ABRAHAM HUME, D.C.L., LL.D., F.S.A., &c. communicated a Paper on "Heraldry," which, in the absence of the author, was read by Mr. Bloxham.

## THIRTEENTH MEETING.

ROYAL INSTITUTION.—May 1, 1854.

JOSEPH DICKINSON, M.D., F.L.S., &c., PRESIDENT, in the Chair.

Mr. G. W. BAHR and Mr. JOHN B. ASPINALL were balloted for, and duly elected Ordinary Members.

Mr. J. B. YATES communicated a Paper, entitled "The Attraction of Ellipsoids considered Geometrically," by Matthew Collins, B.A.

The Rev. J. B. MOSS read a Paper on the Chemical Properties of the Torbane Hill Mineral.

The Rev. ARTHUR RAMSAY, M.A., read a Paper on the

## LIFE AND CHARACTER OF HOBBS.

I AM about to occupy your time, and, I would fain hope, your attention this evening, with a few remarks on the Life, Character, and Philosophy of a man remarkable indeed in his generation,—a man whose views a Warburton, a Clarendon, a Butler, a Cudworth, a Bramhall, and a Tenison thought it worth their while to controvert,—a man whose system and opinions not only exercised a wide-spread and deep-seated influence on his own contemporaries, but have also extensively moulded and coloured the tone of thought of subsequent generations; I mean the philosopher (if so we may call him) of Malmesbury—Thomas Hobbes.

Hobbes has been the subject of many fulminatory denunciations, and much moral horror, both in his own and in our times. We shall, however, on the present occasion, be acting in a far wiser, a more manly, and more christian-like spirit, if, instead of loading him with obloquy, or regarding him with a kind of superstitious dread, we strive to *understand* him—to understand the influences under which he acted—the mistakes into which he fell—the work which he did in his own generation,—and the lesson which, even in his errors, he may teach to ours.

Before we proceed to consider Hobbes in his most prominent and best known character, as the reproducer and reviver, in a very peculiar and original form,—and, as far as England is concerned, the founder of a most pernicious system of metaphysical philosophy,—let us first take a glance at the man, ever bearing in mind that "errors in the head by no means universally imply a corresponding want of rectitude in the



heart," and showing all toleration to the individual, though none for those principles of his which we conceive to be erroneous or hurtful. And, however we may reprobate the views of the philosopher, I think we cannot but accord a high degree of admiration to the man, to the independence of his spirit, the individuality of his character, the versatility of his talents, the depth and accuracy of his knowledge, the variety and extent of his acquirements.\* In this latter point especially, he may well excite our astonishment, when we cast an eye over a catalogue of his works, and observe the diversity of subjects that engaged his attention. Treatises on Law and Jurisprudence, on Moral, Metaphysical, Natural, and Mathematical Philosophy, were for ever flowing from his pen. Nor was this all; to him we owe one of the first, and what still continues to be the best translation of the most difficult and instructive of the Greek Historians.† Undaunted by previous inexperience, at the age of eighty-seven, he betook himself to the composition of Poetry, writing his autobiography in latin verse, and even publishing a translation of the Iliad and the Odyssey, an enterprise in which he has indeed compassed a great achievement, having succeeded in effectually eliminating all traces of poetry even from Homer.‡ All this is the more remarkable, as he was self-taught, did

\* In his early life Hobbes had been secretary to Lord Bacon, and Bacon is reported to have said of him, that he was the only one of his amanuenses who would understand what he wrote, and anticipate the end of his sentences.

† This translation was undertaken, he assures us, with the purpose of pointing out to the nation the evils of a civil war, such as that in which he was apprehensive the country would be involved, by showing in the history of the Peloponnesian war the fatal consequences of intestine troubles. It was published A.D. 1628, and is said to have been revised by the celebrated Ben Jonson.

‡ Of Hobbes's poetry, Pope truly says, "It is too mean for criticism." As a specimen of his mode of rendering Homer, we may instance some of the opening lines:—

" Whilst the two princes of the army strove,  
King Agamemnon and Achilles stout,  
That so it should be was the will of Jove;  
But who was it that made them first fall out?"

Almost the only lines which have found any admirers are those descriptive of the infant Atysanax in the scene of the parting of Hector and Andromache:—

" Now Hector met her with her little boy,  
That in the nurse's arms was carried;  
And like a star upon her bosom lay  
His beautiful and shining golden head;"

and those describing the descent of Apollo at the prayer of Chryses:—

" His prayer was granted by the Deity,  
Who, with his silver bow and arrows keen,  
Descended from Olympus silently,  
In likeness of the sable night unseen;"

though, as Professor Wilson remarks, there seems something meanly suspicious in this

not commence authorship till past his fortieth year, and prided himself pre-eminently upon being "*homo unius libri*," making a boast of having read so little—for, as he arrogantly remarked, "Had he read as much as other men, he should have been as ignorant."\*

Closely allied to this arrogant self-confidence was that other salient point in his character, already noticed—his independence. Though from his earliest years an inmate of noble houses, though the tutor and friend of princes and peers,† he never hesitated to express his opinions, however obnoxious they might be, even at the risk of losing, nay with, as it proved, the actual loss of royal and courtly favour. All these—his independence, his arrogance, his self-confidence, his cold and passionless temperament, his want of human sympathies, and his calm and regular moral habits, which enabled him to attain the wonderful age of ninety-two—are so many traits and marks of the man's peculiar idiosyncrasy; and in all these points he most curiously resembles that other and more modern advocate of the philosophy of self-love, Jeremy Bentham, who, as well as Hobbes, exemplified, as far as possible, his system in his life.

So much for the character of the man, and now let us proceed to examine his philosophy. Here it will be necessary to confine ourselves principally to a consideration of Hobbes's worth and influence as a metaphysical philosopher; and yet, in taking this course, we shall perhaps be hardly dealing fairly with Hobbes, as he professes to be especially a writer on the science of government, and his *Metaphysical Theory* is but the necessary foundation on which to build his *Political System*. Still, if we are to come to a clear understanding of the origin, the basis, and the consequences of Hobbes's errors, we must view him as a psychologist. There are, however, but two of his works which bear directly on the subject of moral and metaphysical philosophy,

stealthiness of the god; and following immediately in the wake of these lines, as if to show that his success was as accidental as it is momentary, we have—

"His bow and quiver both behind him hang,  
The arrows chink as often as he jogs,  
And as he shot, his bow was heard to twang,  
And first his arrows flew at mules and dogs."

\* Another of his arrogant boasts was, that "though *Physics* were a new science, yet *Civil Philosophy* was still newer, since it could not be styled older than his book '*De Cive*.'"

† Hobbes was private tutor in the family of the Earl of Devonshire, to whose son he dedicated his "*Thucydides*:" and in 1647, he was appointed mathematical tutor to Charles II. then Prince of Wales, whose esteem and regard he so won, that Charles always spoke of him with kindness and affection, kept his old tutor's portrait in his study, and after the Restoration, presented him, unasked, with a pension of £100.

namely, his "Treatise on Human Nature," published in 1650, and his "Leviathan," published in 1651. Every thing of importance in the former treatise is repeated in the "Leviathan," where his views are re-stated with greater fulness, precision, and clearness. To this work, therefore, we will principally confine ourselves.

Before entering upon an examination of the doctrines of the "Leviathan," it may be useful to give a short account of its history. Hobbes, as I have already had occasion to observe, had been mathematical tutor to Charles II.; and from his consequent connection with the Royalists, he found himself at the commencement of the Protectorate an exile in France. It was during his residence there that he wrote the "Leviathan," which was printed and published in England, the sheets being sent to him at Paris to correct. With respect to the secondary motives, which may, in part at least, have influenced him in promulgating the political opinions advanced in that book, *precisely at this time*, Clarendon, in one of his smaller and less known treatises,\* tells a curious story. After relating a conversation held with Hobbes in Paris, when both were exiles, he says, "Upon which I asked him why he would publish such doctrine; to which, after a discourse between jest and earnest upon the subject, he said, 'The truth is, I have a mind to go home.'"<sup>†</sup> And although (as I have before observed) many of the fundamental principles of the "Leviathan" had been already published in his work on "Human Nature;" yet there seems little reason to doubt that this home-sickness of Hobbes had its share in leading him to the conclusion he there arrives at—that whoever could best protect him had the strongest claim to his allegiance. His wish to return to his country was soon gratified, for he was compelled to fly from Paris, and escaped to England, where Cromwell, pleased to have such an able vindicator of his usurpation, suffered him to remain undisturbed.

Thus we see that that system of Materialism which has already produced the Sensualism of Locke,<sup>‡</sup> the Scepticism of Hume and Voltaire,

\* The title of this pamphlet is "A brief View and Survey of the dangerous and pernicious Errors to Church and State in Mr. Hobbes's Book entitled 'Leviathan.'" Its object is to show that Hobbes's principles are in direct opposition to the doctrines of the church.

<sup>†</sup> Clarendon tells us, in the same little treatise, that Hobbes "Presented his book, engrossed in vellum in a marvellous fair hand, to the king." Charles, however, being persuaded that it contained principles subversive of both religion and loyalty, withdrew his favour from the philosopher and forbade him his presence. Clarendon also gives us the history of the "Dedication to Francis Godolphin," which was in consequence of Sidney Godolphin, in admiration of his great parts, having left Hobbes a legacy of £200.

<sup>‡</sup> By Sensualism here I mean the system which reduces all Knowledge and Truth to the perceptions of Sense, i.e. to Observation and Experience.

the Moral Philosophy of Paley, and the Utilitarianism of Bentham—which had its share in bringing about the French Revolution of the 18th, as well as the Chartism and Socialism of the 19th century—owes its rise, or, to speak more truly, its *revival* in England (for the sophists of Greece had anticipated it all,) not, as its advocates pretend, to Bacon,\* but to the circumstance of Hobbes having “a mind to go home.”

Before entering upon an exposition of his metaphysical system, Hobbes, in the introduction of his book, gives us a glimpse of the length to which he was prepared to carry the materialism, and (so to speak) the mechanical nature of his views. “Seeing,” he says, “that life is but a *motion* of limbs, why may we not say that all automata (engines that move themselves by springs and wheels, as doth a watch,) have an artificial life? For what is the heart but a spring, and the nerves but so many strings, and the joints but so many wheels, giving *motion* to the whole body, such as was intended by the artificer?” We shall have occasion hereafter to observe how Hobbes again and again returns to this idea, in which, as in most things, the Greeks had been before-hand with him, since this principle of all life being motion, formed the very ground-work of the system of the Ionian philosophers.† In the

\* Tenneman, Ritter, Schlegel, and other high authorities, are all of opinion that the vulgar notion of Bacon having been a mere experimentalist has no foundation in fact. So far from favouring the sensualistic philosophy, he asserts that “enquiry into the *sensible* and *material*” is but a secondary kind of philosophy; and (“Advancement of Learning,” p. 44; Montague’s edit.) he shows that real knowledge does not proceed from “observation and experience,” or from the variable representations of the *senses*, but is concerned about that which is. Frederick Schlegel well says of Bacon, “The dangerous consequences produced by the injudicious extension of his principles, at the time when his followers and admirers in the 18th century thought they could derive more than he had ever dreamt of from experience and the senses, were indeed alarming and reprehensible, but they cannot with justice be ascribed to the spirit of Bacon. Not only in religion, but even in natural science, this great man believed in many things which have been despised as mere superstitions by his followers and admirers in later times. How little he himself partook in the rude materialism of his followers may be abundantly proved, &c.” In fact the systems of Hobbes bore the same relation to that of Bacon as Neo-Platonism did to the Platonic philosophy. (See Coleridge’s *Friend*, vol. 3, essay ix.)

† The Ionian philosophers, directing their whole attention to *external* nature, and observing that the whole of the *physical* creation was continually undergoing a series of changes, maintained that *everything* was like a river, in a perpetual flux; and this theory of the flux of all things, of *Becoming* alone remaining to the exclusion of *Being*, quickly paved the way to the denial of any general standard of knowledge, and to that assertion, first openly made by Protagoras, that there is no such thing as *universal and immutable Truth*, but that the individual man is the measure of all truth—the dogma here broadly proclaimed with all its consequences by Hobbes, and afterwards stripped of the plain unadorned garb with which he had invested it, and brought forward, veiled in another and apparently more philosophical form by Locke; for he, in common with the

first part of the "Leviathan," to which I intend to confine my remarks, Hobbes, in a masterly and orderly manner, and in language clear as crystal, and solid as crystal too, sets himself to work to explain and develope his then novel views on Moral and Metaphysical Philosophy. Well knowing the peculiar force of an unqualified and startling assertion, he commences his book with a "*petitio principii*" of the very broadest kind. "Concerning the thoughts of men," he says, "the original of them *all* is what we call *SENSE*." Before this dogma of Protagoras,\* thus revived by Hobbes, could gain any wide-spread belief among men, all imagination must be destroyed. It is, therefore, at the Imagination, the source of all that is noble and beautiful, that Hobbes aims his next blow. "Imagination," he proceeds, "is nothing but decaying sense, and is found in men as well as in many other living creatures, as well sleeping as waking, . . . . . so that Imagination and Memory are but one. Much memory, or memory of many things, is called Experience." Having thus ingeniously reduced Imagination to Experience, he next proceeds to deny the existence of Ideas. "Whatever we imagine is *finite*; therefore there is no idea nor conception of any thing that we call *infinite*." We may here again observe that Locke's† theory of all ideas being acquired by

Ionian sophists, places Truth in observation and experience, i.e. in *Perception*. Locke's admirer and disciple, Horne Tooke, expresses this doctrine in the clearest and fullest manner, when he says. "*Truth* is nothing but what every man *knoweth*; there is no such thing as eternal, immutable, everlasting truth; for the *truth* of one person may be opposite to the truth of another," a passage in which the philology is as faulty as the morality and the metaphysics.

\* It has already been shown that the error of Protagoras arose from conceiving the material creation to be everything. Seeing everything perceptible by sense to be undergoing a perpetual change, he concluded that Science and Truth must be changeable and uncertain, confusing the conceptions peculiar to physical with those peculiar to moral and dialectical science, and founding that system of cold and barren materialism, which, itself denying Truth, has set up its claim for truth.

† Locke, and the large class of moral philosophers who have adopted his system, deny the existence of innate ideas, and, consequently, all innate moral sense of right and wrong, though, as I have elsewhere shown, these very words, *right*, *wrong*, *duty*, *ought*, &c., imply those innate moral obligations which the writers of this school are so anxious to disprove. It would be difficult to say how the geometrical idea of a point, as "that which has no parts or magnitude," or of a line, as "length without breadth," could be obtained from any deductions of observation or experience. The German philosopher Novalis has well observed that every science has some ideal aim far above all experience, and impossible to be derived from any experience,—mechanics, its perpetual motion; chemistry, its *menstrum universale* and philosopher's stone; mathematics, its quadrature of the circle; physics, its vital elixir; politics, its free and perfect form of government; and philosophy, its first principle. (See Novalis's "*Schriften*," vol. 2, p. 231; and "*Comp. Coleridge's Friend*," vol. 2, p. 172; "*Church and State*," p. 11-23; and the "*Dialogue between Democritus and Socrates*," p. 102.)

observation and experience, i.e. of being mere conceptions, is fairly anticipated by, and evidently founded upon, these principles of Hobbes, which had already extensively leavened the spirit of the age, and disposed it to the more favourable reception of the Lockian philosophy. From this doctrine, that there is no such thing as an idea, it follows that there is no idea of Truth, and therefore the True must consist in mere words. This conclusion Hobbes expresses thus, "True and false are attributes of *speech*, not of *things*; and where speech is not, there is neither truth nor falsehood." Hobbes has anticipated many great names in literature. Mr. Hallam has shown\* that he anticipated Descartes; we have already seen how he anticipated Locke; and in the passage just quoted he has anticipated Horne Tooke in his celebrated assertion that truth varies with the man, being nothing more or less than that which each man *troweth*. "Sceing then," proceeds Hobbes, "that truth consists in the right ordering of *names* in our affirmations, a man that seeketh precise truth had need to remember what every name he uses stands for." Here we may observe an obvious confusion between *real* and *relative* truth; if fact, a curious, if not a cunning, substitution of relative and verbal for real and actual truth.

The next great step in Hobbes's "Theory of Morals," is to confuse between the *Reason* and the *Understanding*, as he has already done between *Ideas* and *Conceptions*, and between *Real* and *Relative* Truth. And here we must bear in mind the Platonic distinction between the Pure Reason and the sensuous Understanding—a distinction which, up to Hobbes's time, had been observed or implied by almost all our great writers: by Bacon, Hooker, Shakespeare, Harrington, Milton, Jeremy Taylor, Leighton, and the other master minds of English literature.†

\* "Literature of Europe," vol. 3, p. 270. Mr. Hallam thinks that, though Locke must have read Hobbes, he did not borrow from him quite so much as is generally supposed.

† All these great men have in their writings pre-supposed some intuitive faculty, corresponding to the *νόησις* of Plato, and the "Reine Vernunft" of Kant, independent of observation and experience, "call it what you will, the pure reason, *lumen siccum*, *νοῦς*, *φῶς νοερόν*, intellectual tuition, or the like." Bacon terms it "*lumen siccum*," "*lux intellectus*," "*divine dialectic*," and a "sparkle of the purity of man's first estate;" and opposes it to the "*opinio madida*," or "*humida*," i.e. the tuition of the understanding, and to the "reports of the senses," i.e., perception. (Advancement of Science, p. 181 and 316.) Hooker's definition is admirable:—"By Reason man attaineth unto the knowledge of things that are and are not sensible." He also calls it "the divine power of the soul," and the "light of the eye of the understanding," from which he expressly distinguishes it. (See "Divine Polity," Bk. I., ch. vii.) Shakespeare, too, talks of "large discourse and Godlike reason," answering to Milton's "*Reason discursive and intuitive*." The whole question is fully discussed by Coleridge, ("Aids to Reflection," see Aphorism ix.,) who defines reason as the power "affirming truths which no sense could perceive, no experiment verify, and no experience confirm," and understanding as "the faculty judging according to sense," or "the power which substantiates phenomena *substat eis ut intelligat*."

These intellectual giants saw, that if we would attain unto wisdom, we must separate Truth and Being from the Perceived and the Perceptible, and that before we can do this, we must also separate that infinitely higher power in man, the "*godlike Reason*," (as Shakespere calls it,) cognisant about Truth and Being, from its proper subject, the *sensuous Understanding* cognisant only about the Perceived and the Perceptible.

But Hobbes thought differently. He opined that Reason was a talent for mathematics; and so he says, "When a man reasoneth he doth nothing else than conceive a sum total from addition of parcels, or conceive a remainder from subtraction of one sum from another. . . . . *Reason is nothing but RECKONING*, (i.e. adding and subtracting.) . . . . . From this it appears that reason is not, as sense and memory, born with us; nor gotten by experience only, as prudence is, but attained by industry. Children, therefore, are not endued with reason at all till they have attained the use of speech, but are called reasonable creatures, for the possibility apparent of having the use of reason in time to come." So that, according to Hobbes, children differ in nothing from the beasts of the field, but in having five fingers on each hand, and in nothing whatever from the young monkey, to which they are often assimilated. Thus Hobbes has anticipated not only Descartes and Horne Tooke, but also Helvetius and Lord Monboddo. According to his beautiful science of moral arithmetic, reason is a talent for mathematics, and "this fair world" a world of calculating machines.

Before we proceed with our analysis of the "*Leviathan*," we must recall to mind that it is Hobbes's object to prove that *Might=Right*;—that the monarch for the time being is the rightful monarch, and that, therefore, Hobbes, or any other man, might, without compromising his honesty, loyalty, or patriotism, acknowledge Cromwell as his liege lord and master. Thus it became necessary to degrade all those inward passions and feelings, which would naturally rise up in rebellion against such a doctrine by making them out to be nothing more than mere sensations.

In order to do this, he first (as we have seen) assumes, with the Ionian sophists, that all things are in a perpetual flux or state of motion;—and that to this motion (*κίνησις* or *φάρα*), every thing spiritual, intellectual, and bodily, is to be referred. The motion on the organs of man's body, caused by the action of things we see, hear, or touch, is, according to him, called *sense*.\* This motion he divides

\* "Sense is motion in the organs and interior parts of man's body, caused by the action of the things we see and hear."—*Leviathan*.

into motion towards something (*προσφύρα*), which he calls Appetite,\* and motion from (*ἀποφύρα*), which he calls Aversion. Appetite he also calls Desire, or Love,† and aversion Hate; and "those things which we neither desire nor hate, we are said to contemne, Contempt being nothing else but an IMMOBILITY." In order to establish the reign of Motion, under the forms of Appetite or motion to, Aversion or motion from, and Contempt, or freedom from all motion, Hobbes next proceeds to deny the existence of any absolute good or evil. "Whatsoever is the object of any man's appetite or desire, that is what he, for his part, calleth *good*; and the object of his hate and aversion, *evil*. For these words, good, evil, and contemptible, are ever used with relation to the person that useth them; there being nothing *simply or absolutely so, nor any common rule of good or evil to be taken from the objects themselves*, but from the person of the man, where there is no commonwealth, or in a commonwealth from the person that representeth it." The sense of Appetite, or Aversion to or from an object, Hobbes calls Delight or Trouble. Those delights which arise from the sense of an object present he calls Pleasures of Sense;—those which arise from expectation of consequences, Joy. "In the like manner, displeasures are some in the sense, and called Payne: others in the expectation of consequences, and called Grief." And then Hobbes proceeds to pack all human passions and feelings into this theory of his, resolving them all into motion *to* or *from*, i.e. into *Appetite* or *Aversion*, under the different forms of desire, love, and joy, hate and grief.‡ Even with the aid of his great *petitio principii*, it is curious to see what manifold turnings and windings he has to make—what violence he is obliged to put upon the plain meaning of common words, in order to prevent them giving the lie to his system. Hope he defines to be "appetite, with opinion of attaining;" Kindness, "love of persons, society;" Admiration, "joy from apprehension of novelty;" "sudden glory is the passion which maketh those grimaces called laughter."§ Thus love, reverence, admiration, kindness and hope, are all referred to Appetite, i.e. to Motion. Again, "Aversion,

\* It is a curious instance of Hobbes's acuteness, that the meaning which he gives to the word *peto*, is precisely that attributed to it by modern philologists.—See *Key's Latin Grammar*, p. 541.

† "Desire and love," he says, "are the same thing."

‡ "These simple passions called appetite and desire, love, aversion, hate, joy, and grief, have their names for divers considerations diversified."

§ In the "Human Nature," his definition of laughter is "A sudden glory arising from a sudden conception of some eminency in ourselves, by comparison with the infirmity of others, or with our own family, for men laugh at the follies of themselves past."



with hope of avoiding hurt by resistance, is Courage." "Sudden courage, Anger." "Contempt of little helps and hindrances, Magnanimity." "Aversion, with opinion of hurt from the object, Feare." "Feare of power invisible, feigned by the mind, or imagined from tales publicly allowed, Religion; not allowed, Superstition. And when the power imagined is truly such as we imagine, True Religion."

We may admire this ingenious reduction of Maguanimity to Contempt, and Religion to Aversion, which if it be "truly such" is "true," and compare what follows with his preceding definitions of "glory" and "laughter." "Grief from opinion of want of power is called Dejection;" "sudden dejection is the passion that causeth weeping, and is caused by such accidents as suddenly take away some vehement hope." "Therefore *some weep for the sudden stop made to their thoughts of revenge by reconciliation*;"\* "Grief for the discovery of some defect of ability is Shame;" the "contempt of good reputation is called Impudence;" "grief for the calamity of another is called Pity, and *ariseth from the imagination that the like calamity may befall himself*;" and therefore is also called Compassion, and, in the phrase of this present time, a Fellow-feeling." "Grief for the success of a competitor is Emulation." Having thus reduced religion, courage, emulation, sorrow, shame, and compassion, to Aversion, i.e. also to motion, Hobbes goes on in the next chapter to lower Conscience and Faith. "When two or more know of one and the same fact, they are said to be *conscious* of it, which is as much as to know it

\* The definitions given here are deliberately revised and repeated from his work on "Human Nature." There he says of Reconciliation, "Men are apt to weep that prosecute revenge, when the revenge is suddenly stopped or frustrated by the repentance of their adversary; and such are the *tears of reconciliation*."

In his "Human Nature," he says, that in beholding the danger of a ship in a tempest, though there is pity which is grief, yet "the delight in our own security is so far predominant, that men are usually content in such a case to be spectators of the misery of their friends;" and again, speaking of "a passion, sometimes called love, but more properly goodwill, or charity," he says, "The affection wherewith men many times bestow their benefits on strangers is not to be called charity, but either contract, whereby they seek to purchase friendship, or fear, which makes them to purchase peace." Perhaps the best refutation of this preposterous attempt to reduce all our feelings and actions to the desire of power is to be found in Bishop Butler's First Sermon on Human Nature, where he remarks, "Is there not often the appearance of a man's wishing that good to another which he knows himself unable to procure him; and rejoicing in it when bestowed by a third person? And can love of power any-way possibly come into account for this desire or delight? Is there not often the appearance of men's distinguishing between two or more persons, preferring one before the other to do good to, where love of power cannot in the least account for the distinction and preference." All three sermons, as well as the very able preface to them, are directed against Hobbes.

against his conscience." Proceeding onwards, after a short but interesting dissertation, in which he advances a most ingenious and original theory of poetry, namely, that "it pleases for its extravagancy," he asserts the natural equality of all men, maintaining that they are only made different by their passions, all of which passions he reduces to "the more or less desire of power." In this part of his work, Hobbes again anticipates a celebrated modern, Sir Robert Walpole, in his well-known theory, that every man has his price,—“The value or worth of man is, as of all other things, his price, that is to say, so much as would be given for the use of his power,” and “to value a man at a high rate is to honour him.” “Civil obedience proceeds from love of ease, or from fear of death;” “love of virtue from love of praise;” “hate from difficulty of requiting benefits, and from conscience of deserving to be hated;” “confidence and friendship from ignorance.”

In this manner, by means of his grand assumption, Hobbes has succeeded in reducing all our moral feelings, passions, and appetites together. And because such are fittest witnesses of the facts of one another, it was and ever will be a very evil act for a man to speak to Motion; making reverence, love, benevolence, admiration, and hope, to proceed from Appetite, or motion towards an object; sorrow, shame, pity, and anger from Aversion, or motion from an object. All notion of any absolute Good or Evil, Truth or Falsehood, Right or Wrong, he utterly repudiates. At this point we see him gradually ceasing to enlarge on his Moral Theory, and proceeding to raise upon it the superstructure of his Political System. Hobbes's Political Theory may be briefly stated as follows. All men are by nature equal, and all are alike actuated by one restless ruling passion, the love of power; and thus it comes to pass that man's natural equality produces an universal competition and an universal diffidence. The consequence of this diffidence (as he calls it) is war; and thus he supposes that in the earliest stages of society all men would be in a perpetual state of warfare, “and such a warre as is of every man against every man.” It is of course evident that such a state of things could not last long; still, as Hobbes remarks, “The nature of warre consisteth not in actual fighting, but in the known disposition thereto;” and from this known warlike disposition arises a state of universal mistrust and suspicion, which lasts as long as anarchy remains. But, as Hobbes says, “Feare and desire incline men to peace; . . . and reason suggesteth convenient articles of peace upon which men may be brought to agreement. These articles are those which are otherwise called the lawes of nature.” He thus affirms a sense of right to spring from laws, instead of laws from a sense of

right, making the effect prior to the cause. He next proceeds to state what these laws of nature are, deriving them all from his two principles—that naturally every man has a right to every thing, and that all good proceeds from fear, glory, or pride. It is curious to observe how the extravagant nominalism which he had adopted from Ockham leads him to confuse between men and things, positive and moral law; and how in almost every sentence he is obliged to use words such as “ought,” “should,” “right,” “wrong,” and others which imply that innate moral obligation which he is so eager to disprove. “The science of these laws of nature” Hobbes concludes to be “the true and only moral philosophy.” But to put these laws into execution there must be some personal authority. The plurality of wills must become a unity of will by the multitude resolving their several wills into the absolute will of one individual person, or a collective assembly of persons considered as one body; and as the more perfect this unity is the better, Hobbes becomes an advocate for unlimited monarchy, as being the most natural form of government, “as if every man should say to every man I authorise and give up my right of governing myself to this man, or assembly of men, on this condition, that thou give up thy right to him and authorise all his actions in like manner. This done the multitude so united in one person is called a commonwealth, in Latin *civitas*.\* This is the generation of that great LEVIATHAN, or rather (to speak more reverently!) of that mortal God to whom we owe, under the immortal God, our peace and defence.” This last sentence is curious, as explanatory of the frontispiece of the book, which represents the great “Leviathan,” in the shape of a giant despot, rising with his sword and sceptre in all the perfection of beauty and power from amidst a sea of men and towns, like a second Venus from the ocean.

Hobbes next goes on to state that the person in power has an absolute right to that power. Since, according to him, the monarch *de facto* is the monarch *de jure*, and having unlimited power over his subjects, it

\* Hobbes's account of the origin of a state is this:—Man and woman meeting together for purposes of natural lust form an *δικία* or family. A congregation of such families form a *κώμη* or town. Laws are drawn up for mutual advantage, and thus arises the *πόλις* or state; and from these laws come the feelings of right and property, duty, loyalty, and filial obedience. Very different is the reasoning of Aristotle. He (*Polit. Lib. 1.*) shows that the *δικία* met together *χρήσεως ἕνεκεν* *μὴ ἐφημέρου*, and beasts only *χρήσεως ἕνεκεν ἐφημέρου*, and that the *πολις* was a congregation of these *δικίαι* in the improved form of *κώμαι ἀνταρκείας ἕνεκεν*. Cf. also Coleridge (“Church and State,” chap. 1.) who maintains that as the idea of the perfect is always prior to the idea of the imperfect, and the idea of the end precedes the conception of the means, the idea of unity that of duality, and the idea of genus that of species, so the idea of the state is prior to the idea of man, as it is the *τελος* or perfection of his humanity, the full development of his manhood.

follows that for him there is neither right nor wrong, for the idea of right he has already assumed to proceed from the idea of law, and for the absolute despot there can be no law,—“the king can do no wrong.”

Such is Hobbes's political theory. Actuated as man is by that desire of power (which he affirms to be the ruling principle of humanity), his first most natural state is a state of constant warfare, or if not of war, of mutual mistrust and suspicion. Fear and desire, however, inclining men to peace, laws spring up; and as for the execution of these laws some personal authority is necessary, the multitude agree to resolve their wills into the absolute will of one individual person, or a collective assembly of persons. Hence (thus do extremes meet) absolute Despotism is the best and most natural mode of government, and next to that, Republicanism. The feelings of right and wrong\* spring up afterwards from the constitution of laws, and are nothing more than a sense of conformity to, or transgression from, the will of the majority. The result he comes to is, that the subject owes allegiance to the monarch only so long as the latter is able to protect him. This result he expresses in the following language :—“To resist the sword of the Commonwealth, in defence of another guilty or innocent man, no man hath liberty, because such liberty takes away from the commonwealth the means of protecting us; and is, therefore, destructive of the very essence of government. But in case a great many men have already resisted the sovereign power unjustly, or committed some capital crime for which every one of them expecteth death, whether they have not the liberty then to join together, and assist to defend one another? *Certainly they have*; for they but defend their lives, which the guilty man may do as well as the innocent. There was, indeed, injustice in the first breach of their duty. Their bearing of arms subsequent to it, though it be to maintain what they have done, is no new unjust act.” And having educed so much from his principle of force and fear, being the basis of all institutions, he proceeds, “Since the . . . . end or design of men . . . . in the introduction of restraint upon themselves . . . . is the foresight of their own preservation, . . . . the obligation of the sovereign is understood to last so long, and no longer than the power lasteth by which he is able to protect them.” From these passages alone we might have inferred what Hobbes himself told Clarendon, that he had a mind to go home and transfer his allegiance to Cromwell.

It is by no means to the credit of literature that a scholar—a man

\* He makes the idea of wrong to precede that of right.

of learning and ability—the friend of Selden, Harvey, and Cowley\*—could maintain, and not only maintain, but with an Englishman's earnestness and sincerity, require others to believe this view of humanity to be the true one,—could advocate a doctrine which reduces everything to locomotion; which makes Appetite the great “*primum mobile*,” and supposes men to be a set of steam-engines, running against each other with a mutual implacable hatred, and only restrained by the intervention of a set of provisional tram-roads, formed so as to allow to each the greatest possible latitude, and the creation of a despotic Leviathan, or engineer, with an unlimited irresponsible power over all, to see that each keeps to his own line.

And now that we have briefly analysed the moral and political philosophy of Hobbes, and shown but little charity to his principles, let us manifest some for the man. There is, as I have shown, much to admire in his character; and there is also much to account for his adoption of those pernicious principles which he so ably promulgated, and was the first to bring into fashion. It has been said, with a certain degree of truth, that all men are born Aristotelians or Platonists, Nominalists or Realists; and Hobbes was by nature a Nominalist.† Thus the very constitution of his mind, and his natural tone of thought, would of themselves incline to the sensualistic school of philosophers. Moreover, Hobbes lived and wrote in times of civil war, when the bad passions, to which he attributes so much, are most prominently and distinctly brought forward. That Hobbes had meditated much and deeply upon the nature and consequences of these passions, is likely enough from his constant study of Thucydides, (one of his few favourite authors)—a study which enabled him to perceive that the working of the same passions and feelings in his own times, were silently paving the way for troubles similar to those of which the Athenian historian wrote. Moreover, Hobbes was a late learner and self-taught, both of which, in some measure, account for the dogmatical character of his writings. Indeed, the sincerity and downright heartiness with which he brings forward and urges his one idea, bending all else to it, and the thorough contempt which he entertains for all other

\* Hobbes was also intimate with Galileo, Gassendi, Descartes, and others.

† Hobbes studied the logic of the Nominalists, when at Oxford. See Ritter's “*Geschichte der Neuern Philosophie*,” vol. ii. p. 453. Hobbes may also have been partially influenced by one side of Bacon's writings; for the most dangerous errors are those which are the shadows “and ghosts of truth,” caricatures of some great truth, partial truth, lying at the bottom of every widely-spread error, otherwise it could never become widely spread; and Hobbes had none of that true science, which Novalis beautifully defines to be “a voiceless knowledge of what is knowledge,” to guide him.

systems than his own, are grand in their way. His quiet and retired life, which was quite that of a recluse, may serve to explain the extraordinary ignorance of human nature, (especially on its brighter side,) which he so constantly displays.\* Something also must be attributed to a natural and somewhat violent reaction from the philosophy of the preceding age, which was certainly tainted to a great extent with Neo-Platonic mysticism.† Moreover, like Voltaire, Bentham, and other short-sighted men, Hobbes was wonderfully clear-sighted, as far as he did see, and so had no notion of anything beyond what met his intellectual eye, lying beneath the surface. The chief causes of his errors, however, are the confusion which he makes between the Reason and the Understanding—between Ideas and Conceptions, between relative and positive Truth, from his utterly ignoring all moral sentiment, and innate sense of duty;‡—and from his unphilosophical method of proceeding from the outward to the inward, instead of the reverse. From Hobbes, as from most other men of one idea, we may learn much, if we know how to read him. He thought for himself, which, as Lessing says, is better, even if you think wrongly, than not to think at all; while the originality of his thoughts, and the startling character of his paradoxes, force his readers to think. Another good point in Hobbes is, that he acted thoroughly up to his principles; and it is, indeed, a good thing, as well as a rare one, when the founder of a philosophical school does act up to his principles—for then we see the tendency of those principles. Did not the disciples of Hobbes and Locke contradict their principles by their deeds every day of their lives, and act more from benevolent instincts and good-hearted impulses than from any fixed principles whatever, it would be pitiable indeed.

\* We must also bear in mind, that Hobbes was a wanderer all his life, without a home, and with but few ties of affection.

† Lord Herbert, of Cherbury, for instance (who, in point of authorship, was an immediate predecessor of Hobbes), maintained that an internal illumination was given to all mankind by means of a closed book in the mind, the clasps of which would only open when nature bade them. The extraordinary doctrines of that philosophic cobbler, the German mystic Jacob Böhme, who is said to have numbered among his disciples our unfortunate martyr monarch, are better known.

‡ Hobbes, we have seen, denies the existence of any moral faculty. Bishop Butler ("Essay on the Nature of Virtue,") in language very similar to that of Coleridge, already quoted, well says, "That we have a moral approving and disapproving faculty is certain, from our experiencing it in ourselves, and recognizing it in others. It appears from our exercising it unavoidably in our approbation and disapprobation even of feigned characters; from the words right and wrong, odious and amiable, base and worthy, with many others of like signification in all languages. Great part of common language and common behaviour is formed upon the supposition of such a moral faculty, whether called conscience, moral reason, moral sense, or Divine reason; whether considered as a sentiment of the understanding, or as a perception of the heart, or, which seems the truth, as including both."

The effect and influence of the writings of Hobbes appears to me to have been usually underrated. It is true that they never became popular in their original form—that the “*Leviathan*” was condemned by Parliament to be burnt by the hands of the common hangman ;—still the principles of these works exercised a very great, though a silent influence, especially among the higher ranks of society, and that large class who adopt opinions, as they do money, because they are current ; and clothe their minds as they do their bodies, according to the newest fashion in vogue. The selfish nature of Hobbes’s morality appears to have extensively leavened the literature of the succeeding age ; and many a sparkling couplet of the poets of the reign of Charles II. owes much of its wit and causticity to one or other of Hobbes’s definitions of our human passions and affections ;—nay, Bishop Burnet, in the “*History of his Own Times*,” goes so far as to ascribe the corruption of the monarch himself to the influence of his old tutor.

Before dismissing Hobbes, I must call your attention to the solidity, brilliancy, and lucid clearness of his style. His intellect, keen and clear, and cold as it is clear, liable to be led astray by no glimmer of affection, or fire of passion—nay, through the very want of these passions and affections, ignoring and misrepresenting many of the fairest and richest tracts on the map of the human heart—rarely, indeed, rises above the creeping selfishness of his ordinary morality ; but still, as far as it does see and know, it illustrates with wonderful force and clearness, and expresses many a worldly maxim with an epigrammatic terseness, which has anticipated celebrated proverbial dicta of after-writers. One example of the happy manner in which he can express an universally-allowed truth will suffice : “ Words are wise men’s counters ; but they are the money of fools,”\*—an observation which we shall do well to bear in mind, when reading Hobbes himself.

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\* As examples of one or two more of such pregnant expressions, we may quote, “ The errors of definitions multiply themselves as the reckoning proceeds ;” “ Men measure, not only all other men, but all other things, by themselves ;” “ Thought is quick.”

## FOURTEENTH MEETING.

ROYAL INSTITUTION.—May 15, 1854.

JOSEPH DICKINSON, M.D., F.L.S., &amp;c., PRESIDENT, in the Chair.

Mr. FRANCIS ARCHER exhibited a living specimen of *Berœ*, taken by Mr. Price at Birkenhead.

Mr. T. C. ARCHER exhibited a large and interesting series of ropes, &c. manufactured from vegetable fibre, principally the produce of the East Indies; also the celebrated fish poison from Demerara.

The Rev. ABRAHAM HUME, D.C.L., LL.D., F.S.A., &c., read a Paper on the "Dialects of the English Language," being the continuation of a Paper read before the Society on the 9th January, 1854.

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## EXTRAORDINARY MEETING.

ROYAL INSTITUTION.—May 29, 1854.

JOSEPH DICKINSON, M.D., F.L.S., &amp;c., PRESIDENT, in the Chair.

The circular convening this meeting—"To receive the REPORT of the DELEGATES appointed at an Extraordinary Meeting held the 31st March last, 'To carry out further arrangements for the proposed amalgamation with one or more of the other Learned Societies, and report thereon, with a sketch of amended laws,'" having been read—

The SECRETARY communicated the following resolutions, passed at a Meeting of the Council held this evening, viz.:—

1. "That this Council, finding that the union of the two Societies under the proposed name is unpalatable to many of the older members of this Society, is of opinion that the union is advisable only in case the name of the 'Literary and Philosophical' be retained, without change or addition."

2. "That the Council consider that if the name of the Society is changed, and a new code of laws adopted, the Society will no longer be the old Literary and Philosophical Society, and that therefore th-



adoption of this report involves an alienation of its funds, and consequently that a majority of nine-tenths are necessary to carry the proposed report."

It was moved by Dr. HUME, seconded by Mr. HEATH—

"That the Report be adopted, subject to the revision of any of the laws contained therein by the amalgamated societies."

Amendment moved by Dr. IHNE, seconded by Mr. J. B. YATES—

"That, before the Report be taken into consideration, the Society determine that the name of the Society be retained unchanged."

The amendment, on being put from the chair, was carried, there being twenty-three votes *for*, thirteen votes *against*.

The amendment being then considered as taking the place of the original motion, it was moved by Mr. HEATH, and seconded by Mr. PICTON—

"That the question involved in Dr. IHNE's resolution just carried be referred to a poll of the whole Society by circular."

On being put from the Chair, this motion was negatived by a large majority.

Dr. HUME then moved, and Dr. IHNE seconded—

"That, subject to the amendment just adopted, and subject to the clause of revision recommended in the Report, this Report be adopted."

On this motion being read from the chair, the following amendment was moved by Mr. SWINTON BOULT, and seconded by Mr. J. FORSHAW—

"That, inasmuch as the advantages to be derived from the age, history, and associations of this Society, can be secured only by maintaining its continuous existence, and it is essential for that purpose that the junction with the Historic Society be completed before the matter included in the Report of the Delegates be considered, such consideration be postponed until the junction has been effected, with the distinct understanding that the revision of the laws shall thereafter be proceeded with, in such manner as the enlarged Society shall determine."

This amendment, on being put from the Chair, was carried by a large majority.

Mr. T. C. ARCHER then moved, and Mr. J. B. YATES seconded—

"That the Report of the Delegates be rejected."

This motion was withdrawn.

On the motion of Mr. SWINTON BOULT, "The thanks of the Meeting to the President, for his able conduct in the chair," was unanimously voted.

## FIFTEENTH MEETING.

ROYAL INSTITUTION.—May 29, 1854.

JOSEPH DICKINSON, M.D., F.L.S., &c. PRESIDENT, in the Chair.

Mr. CHARLES KIRWAN was balloted for, and duly elected an Ordinary Member.

Mr. J. B. YATES exhibited a specimen of Paper (given to him by Mr. DAVID GLADSTONE) made of the fibre of the Plantain *Musa Paradisiaca*.

Mr. F. P. MARRAT exhibited a Lizard, captured amongst the sand hills, at Southport; also specimens of the following Mosses, viz.:—

*Bryum inclinatum*; Annandale, May, 1854.

*Hypnum elodes*; Southport, May, 1854.

*Fissidens incurvus*; Bidston.

*Hypnum medium*; Hooton, April, 1854.

Mr. J. B. YATES exhibited old French documents, containing the Autographs of Louis XIII. and XIV.; also of Marshall Boufflers and the Minister Chamillard.

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## DONATIONS TO THE LIBRARY,

FROM JUNE, 1853, TO JUNE, 1854.

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- ROYAL ASTRONOMICAL SOCIETY.—Proceedings, Vol. XIII., Nos. 7 to 9 ;—Vol. XIV., Nos. 1, 3 to 5 ; *from the Society.*
- HISTORIC SOCIETY OF LANCASHIRE AND CHESHIRE.—Proceedings and Papers, Session V., 1852—1853 ;—Report of the Council, and Abstract of Expenditure, Session V., 1852—1853 ; *from the Society.*
- STEVENSON, WILLIAM.—Abstract of Observations on the Aurora, Cirri, &c., made at Dunse ; *from the Author.*
- LINNEAN SOCIETY.—Proceedings, Nos. 45 to 51 ; *from the Society.*
- ROYAL SOCIETY OF EDINBURGH.—Proceedings, Session 1852—1853 ; *from the Society.*
- LONDON CATALOGUE OF BRITISH PLANTS ; *from the Botanical Society of London.*
- FORBES, PROFESSOR EDWARD.—Educational Uses of Museums ; *from the Author.*
- THOM, ROBERT.—The Lasting Resentment of Miss Keon Swan Wang : a Chinese Tale ; translated by Robert Thom, Esq.
- The Chinese Speaker ; or, Extracts from Works written in the Mandarin Language, as spoken at Pekin ; *both from the Rev. Dr. Thom.*
- DECIMAL COINAGE : What it Ought, and What it Ought Not to be. By One of the Million ; *from the Author.*
- BEST, THE HON. AND REV. SAMUEL.—Thoughts on the Proposal for the Improvement of the Civil Service ; *from the Author.*
- LIVERPOOL ROYAL INSTITUTION.—Address to the General Meeting of Proprietors, held 10th February, 1854 ; *from the Institution.*
- COLLINS, MATTHEW, B.A.—Clairaut's Theorem, and other subjects connected with it ; *from the Author.*
- ROYAL GEOLOGICAL SOCIETY OF CORNWALL.—Thirty-ninth Annual Report of the Council, with the Curator's Report, and Papers and Notices read ; *from the Society.*

HUME, REV. DR.—Education of the poor in Liverpool; a Paper read before the British Association at Hull, 12th September, 1853; *from the Author.*

——— Two Ballads, on the Battle of the Boyne; *from the Author.*

ROYAL CORNWALL POLYTECHNIC SOCIETY.—Twentieth Annual Report; *from the Society.*

COSMOS INSTITUTE—Prospectus of; *from Mr. Isaac.*

REPORT to the Health Committee of the Borough of Liverpool on Sewerage, &c., by James Newlands, C.E.; *from the Author.*

POLYTECHNIC SOCIETY OF LIVERPOOL.—Transactions from September, 1849, to December, 1852; *from the Society.*

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## TREASURER'S ACCOUNTS.—SESSION XLII.

Dr.	<i>The Literary and Philosophical Society, in Account with EDWARD HEATH, Treasurer.</i>	Cr.
1852.		£ s. d.
Oct. 18.—	To Balance as per last Account.....	9 16 1
	To paid W. Turner, Gratuity.....	1 1 0
	" Mrs. Johnson, Tea, Coffee, &c. ....	3 10 6
1853.		
March.	" Thomas Baines, for Printing .....	3 7 6
	" Dr. Thomson, for delivery of Circulars.....	0 10 0
	" Removing Society Property 0 2 3	
June.	" Mrs. Johnson, Tea, Coffee, &c. ....	0 12 3
Sept.	" Secretary's Account— For delivery of Circulars .....	5 4 0
	Stationery, Postage, and Carriage of Parcels.....	3 8 6
	" Thomas Baines, for Printing.....	3 12 6
	" W. Turner, Commission on Collecting	2 6 0
	Balance carried down .....	37 4 10
		£70 13 8
October 1, 1853, Errors excepted,	<i>Signed,</i> EDW. HEATH.	
Audited and found correct,	<i>Signed,</i> { ROBERT M'ANDREW. J. P. G. SMITH.	
	Balance brought down .....	37 4 10
	Standing to Credit of Society in Bank Book....	0 14 10
	Dock Bond bearing 4 per cent. interest .....	100 0 0
		£137 19 8
	Oct. 1.—By 118 Subscriptions, at 10s. 6d. ....	61 19 0
	" 10 Arrears, at 10s. 6d. ....	5 5 0
	" 10 Entrances, at 10s. 6d. ....	5 5 0
	" Sale of Transactions.....	0 7 0
	" One Year's Interest on Dock Bond 4 0 0	
	Less Income Tax.....	0 2 4
		3 17 8

# INDEX.

## A.

Admission of members: form of application altered, 6  
 Antiquities, Saxon, Faussett collection, purchased by Mr. Mayer, 131, 143  
 Archer, F., elected on Council, 5; exhib. corundum, 158; exhib. pebble basalt, 143; exhib. specimen of berbe, 175  
 Archer, T. C., elected member, 66; exhib. specimens of vegetable fibre and fish poison, 175  
 Arts promoted by war, 57  
 Aspinall, J. B., elected member, 159  
 Atlantic, North, on geographical distribution of testaceous mollusca in, 8

## B.

Bahr, G. W., elected member, 159  
 Banister, Rev. W., elected member, 130  
 Basalt, pebble, exhib., 143  
 Bennett, W., elected member, 93  
 Berbe, living specimen, exhib., 175  
 Bloxam, F. W., on the minor poets of the day, 144; exhib. Milton's *Paradise Lost*, 158  
 Books presented, 178  
 Boulton, Joseph, on development of arts promoted by war, 57  
 Brakell, Mr. Thos., offer to print copies of report on union, 6; vote of thanks to, 142  
 British Association alluded to, 67; grant of £50 to local fund, 92  
 Burke, W., exhib. MSS. works on book-keeping, 93  
 Byerley, I., elected on Council, 5; exhib. torpedo nobiliana, 7

## C.

Canoes found at Glasgow, 131  
 Catillas, fossil, exhib., 93  
 Chambres, C. C., resigned, 158  
 Chemists' Association, invitation from, 6  
 Chester, on the Palatinate jurisdiction of, 66  
 Circle sailing, 66  
 Clare, J. L., exhib. fossil *panopæa aldovandi*, 93  
 Clyde, raised beaches of, 131  
 Cobalt, arsenical sulphuret of, exhib., 130  
 Collins, M., on the attraction of ellipsoids, 159  
 Coins, exhib. from the Punjab, 158  
 Cornistaneite, exhib., 57  
 Corundum, exhib., 158  
 Council, report of, 1  
 Council and officers, vote of thanks to, 5  
 Cox, Mr. H., exhib. earth worm, 57

## D.

Denham, Capt., on temperature of sea, 9, note  
 Derby Museum, opening of noticed, 3  
 Dialects, English, Dr. Hume on, 92, 93, 175  
 Dickinson, Dr., elected on special committee, 157  
 Donations to Library, 178

## E.

Edwards exhib. photographs of *torpedo nobiliana*, 7  
 Ellipsoids, on the attraction of, 159  
 English Dialects, Dr. Hume on, 92, 93, 175

Exhibited:—F. Archer, specimens of berbe, 175, pebble basalt, 143, corundum, 158; T. C. Archer, specimens of vegetable fibre and fish poison, 175; F. W. Bloxam, Milton's *Paradise Lost*, 158; W. Burke, manuscript works on book-keeping, &c., 93; I. Byerley, torpedo nobiliana, 7; H. Cox, earth worm, 57; J. L. Clare, fossil *panopæa aldovandi*, 93; Professor Griffith, fossils, 93; Dr. Hume, flint hammers, &c., 130, manuscripts on Liverpool election 1670, 57, minerals, 93; J. Jones, coins from Punjab, 158; R. M'Andrew, prawns, 93; F. P. Marrat, minerals, 130, lizard and mosses, 177, cornistaneite, 57; T. Sansom, fossils from chalk, 93; Queen's matrimonial ladder, 158; J. B. Yates, paper from plantain, 177, old French documents, 177, Victoria nugget, 7  
 Extraordinary Meetings, 7, 56, 92, 142, 143, 157, 175

## F.

Faussett Museum, purchased by Mr. Mayer, 131, 143  
 Ferguson, W., on the raised beaches of the Frith of Clyde, with notices of canoes, &c., 131  
 Fibre, vegetable, exhib., 175  
 Fischel, Rev. A., on Joost Van Vondel, 145  
 Fish poison, exhib., 175  
 Fletcher, F. D., elected member, 93  
 Fossils exhib., 93

## G.

Gee, Dr. R., elected member, 93  
 Glasgow, canoes found at, 131  
 Godden, Joseph, elected member, 66  
 Grant of £50 for British Association, 92  
 Greenwood, Henry, elected member, 57  
 Griffiths, Professor, exhib. fossils, 93

## H.

Hartnup, John, elected on Council, 5; on special committee, 57, 143, 157; observations on Mr. Hind's new planet, 57; letter from, read, 142  
 Hebson, Edward, death of, noticed, 1  
 Heath, Edward, elected treasurer, 5; on special committee, 56, 143, 157  
 Heraldry, Dr. Hume on, 158  
 Hind, Mr., discovery of a new planet, 57  
 Hobbes, on the Life and Character of, 150  
 Horace's Ode to Pyrrha, 145  
 Howson, Rev. J. S., elected on Council, 5; letter from read, 142  
 Hume, Rev. Dr., on English dialects, 92, 93, 175; on some flint hammers, &c., 130; on heraldry, 158; exhib. manuscript of Liverpool election 1670, 57; exhib. a mineral, 93; vote of thanks to, 92

## I.

Inne, Dr., on Milton's *Paradise Lost*, 93, 94; on Horace's Ode to Pyrrha, 145; elected on Council, 5; on special committee, 56, 143, 157  
 Inman, Thos., M.D., elected V.P., 5; on special committee, 157  
 Inoceramus mytiloides, exhib., 93

## J.

Jones, John, elected member, 93; exhib. coins from Punjab, 158  
Joost Van Vondel, Rev. A. Fischel on, 145

## K.

Keates, John, elected member, 66  
Kirwan, C., elected member, 177

## L.

Lassell, Wm., elected on Council, 5  
Lead, sulphuret of, exhib., 130  
Library, donations to, 178  
Library Committee, address to Town Council on, 7  
Lidderdale, W., elected member, 93  
Liverpool, election of, 1670; Dr. Hume exhib. MSS., 57  
Lizards exhibited, 177  
Lowndes, R., resigned, 158

## M.

M'Andrew, Robert, on Geographical distribution of Testaceous Mollusca, 8; on Spanish poetry, 158; elected vice-president, 5; on special committee, 157; exhib. prawns, 93  
McNicholl, Thos., elected member, 66  
Marrat, F. P., exhib. lizard and mosses, 177; corn-istanite, 57; minerals, 130  
Mayer, Mr., purchased the Faussett Museum, 131, 143  
Melly, George, elected member, 130  
Members elected:—*Corresponding*: Rev. J. Booth, LL.D., F.R.S., 6. *Ordinary*: T. C. Archer, 66; J. B. Aspinall, 159; G. B. Bahr, 159; A. Baldey, 6; Rev. W. Banister, 130; W. Bennett, 93; F. D. Fletcher, 93; Dr. R. Gee, 93; Joseph Godden, 66; H. Greenwood, 57; John Jones, 93; John Keates, 66; C. Kirwan, 177; W. Lidderdale, 93; Thomas McNicholl, 66; George Melly, 130; C. G. Mott, 158; W. H. Pearse, 57; Rev. James Porter, 66; F. Prange, 93; W. Rees, 93; T. Rigge, 145; J. M. Shain, 6; J. A. Sommers, 6  
Members, form of application for admission, altered, 6  
Members removed from list, 1  
Members resigned, 1  
Milton's paradise lost, 93, 94  
Mineral from coal, exhib., 93  
Minerals exhib., 130  
Mollusca, R. M'Andrew, on geographical distribution of, 8  
Moore, Rev. Thomas, vote of thanks to, 92  
Moss, Rev. J. J., on the Torbane Hill Mineral, 159  
Mosses exhib., 177  
Mott, C. G., elected member, 158

## (O).

Officers, vote of thanks to, 5  
Orthocera calamiteum? exhib., 93

## P.

Paper made of plantain, 177  
Papers read:—F. W. Bloxam, minor poets of the day, 144; J. Boulton, development of arts promoted by war, 57; M. Collins, on the attraction of ellipsoids, considered geometrically, 159; W. Ferguson, on the Frith of Clyde, 131; Rev. A. Fischel, life and writings of Joost Van Vondel, 145; Dr. Hume, on English dialects, 92, 93, 175; on heraldry, 158; Dr. Ihne, on the paradise lost of Milton, 93, 94; M'Andrew, on the distribution of mollusca in the North Atlantic, &c., 8; Rev. J. J. Moss, on the Torbane Hill mineral, 159; Rev. A. Ramsay, on the life and character of Hobbes, 159; J. T. Towson, on great circle sailing, 66.

## Paradise Lost, 93, 94

Planet, discovery of, 57  
Plantain, paper made of, 177  
Poetry, Spanish, R. M'Andrew on, 158  
Poets, Minor, Mr. Bloxham on, 144  
Poison, fish, exhibited, 175  
Porter, Rev. Jas., elected member, 66  
Prange, F., elected member, 93  
Prawns, exhib. by Mr. M'Andrew, 93  
Presidents and Secretaries of Societies to be admitted to meetings, 3  
Proceedings to be published annually, 57

## Q.

Queen's matrimonial ladder, exhib., 158

## R.

Ramsay, Rev. A., on the Life of Hobbes, 159  
Rees, W., elected member, 93  
Report of Council, 1  
Rigge, T., elected member, 145  
Roscoe, W., centenary of his birthday, 3

## S.

Sailing, Mr. Towson on circle, 66  
Sansom, Thos., elected secretary, 5; on special committee, 56, 143, 157; exhib. Queen's matrimonial ladder, 158; exhib. fossils from chalk, 93; communicated extracts of letter from Mr. Spruce, 144  
Saxon Antiquities, Faussett collection of, purchased by Mr. Mayer, 131, 143  
Sea, Denham on temperature of, 9, note  
Smith, J. P. G., elected on Council, 5; on special committee, 56, 143, 157  
Societies, proposal to unite, 6, 56, 130, 142, 143, 145, 157, 175  
Spanish Poetry, R. M'Andrew on, 158  
Spruce, Richard, extract of letter from, 144  
Staite, Mr., exhibition of electric light, 3  
Subscription, proposal for the raising of, 4; in-  
sommers 7, 56

## T.

Temperature of sea, Denham on, 9, note  
Thomson, D. P., elected on Council, 5; on special committee, 157  
Torpedo nobiliana, exhib., 7  
Torbane Hill mineral, Rev. J. J. Moss on, 159  
Towson, J. T., elected on Council, 5; on great circle sailing, 66  
Treasurer's Accounts, 180

## U.

Union of Societies proposed, 6; proceedings on, 36, 130, 142, 143, 145, 157, 175

## V.

Vegetable fibre, exhib., 175  
Victoria nugget, exhib., 7  
Visitors to be admitted at commencement of meeting, 3  
Vondel, Joost Van, Rev. A. Fischel on, 145  
Vote of thanks to Council, &c., 5

## W.

War, promotion of arts by, 57  
Worm exhibited, 57

## Y.

Yates, J. B., elected vice-president, 5; on special committee, 157; exhib. of Victoria nugget, 7; on the palatine jurisdiction of Chester, 66; exhib. old French documents, 177; paper from plantain, 177







APPENDIX.

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THE  
FAUNA OF LIVERPOOL.

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4

BY  
ISAAC BYERLEY, F.L.S., M.R.C.S.E.

A paper accompanying and explanatory of a printed preliminary Fauna of the district was read on the 31st May, 1852, and it was originally intended to have been published in the Proceedings of that Session ; the Author having thought, however, that advantage might arise from delay, the Council determined upon postponing it until the present opportunity.

## P R E F A C E .

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THE FLORA OF LIVERPOOL having been published by Dr. Dickinson during the year 1851, the animal life of the district was considered by many as equally worthy of attention, and the production of a local FAUNA was thought to be desirable. The zoology of most localities is seldom cultivated by so numerous a train of students as the vegetable kingdom generally commands. The flowers by the wayside rivet the admiring attention even of those who never bestow any scientific criticism upon them; various animals on the contrary, though high in the scale of organisation, excite feelings rather of revolt or disgust than pleasure in certain minds, and, as a consequence, "love at first sight" is a somewhat exceptional occurrence, unless at the uppermost rail of the ladder, and strong prejudice has often to be conquered before many can be induced to touch what they deem "the unclean thing," and examine the beauty that is hidden under a repulsive exterior.

The activity of different species of animals often renders their capture difficult. When marine, the use of the dredge entails a consumption of time such as can rarely be spared by those who have other paramount duties to perform, putting out of account the amount of visceral commotion the unpractised sailor is doomed to endure, and which requires a large zoological profit to compensate, under such circumstances, for the want of pleasure in procuring it. In 1851, by the advice of Mr. R. M'Andrew, several gentlemen subscribed for the purpose of having the shore dredged for specimens, and many trips were taken in the Mersey, along the coast as far as Formby, at the north of the Cheshire peninsula, and up the Dee as far as Dawpool.

These expeditions brought to light several species which were not supposed to have existed in the neighbourhood, and of others (shelled mollusks) which had only been found before in the dead state, living specimens were ascertained to inhabit deeper water.

Still much more might be done by a well conducted and longer continued system of dredging. The Hoylake fishermen have been fertile sources for obtaining specimens, though it is difficult to induce them to take care of what they find. Burnet's fluid was supplied to them, into which, diluted (1 part to 9) with water, they were requested to put captures, but in some instances, when daily visits could not be paid, time, the cat, or the children made sad havoc.

## PREFACE.

Much of our zoological literature is scattered through periodicals and other works, which are expensive and not easy of access, and, in consequence, some difficulty is often experienced in classification, and in the determination of species.

These remarks are made as an apology for any short-comings in this first attempt at a Fauna, the materials for which must always be receiving additions, and thus it can never be perfect. Much as I may feel on my own account, I must not dilate upon its imperfections, in justice to several industrious workers who have kindly assisted. Whilst dredging, the Rev. H. H. Higgins, Messrs. Webster, Samuel Archer, Marratt, and Cameron, afforded the greatest help; without their efforts much of the information relative to the creatures in the neighbouring waters could not have been obtained. The last-named gentleman undertook, single-handed, the not over agreeable or safe duty of dredging the Mersey.

The entomologists of the district, almost without exception, especially Messrs. Brockholes, Warrington, Diggles, Almond, and other industrious investigators, have kindly supplied abundant facts with reference to *Lepidoptera*.

This is the only order of *Insecta* which has been classified and named, as yet, for publication: Mr. Cameron, however, has a large supply of local *Coleoptera*, which we hope will be arranged ere long, and a list of them published. The Rev. H. H. Higgins also has commenced researches amongst *Diptera* and *Hymenoptera*, from which we may reasonably hope to have good results.

The labours of Mr. Price, of Birkenhead, cannot be mentioned in terms of sufficient praise; his discoveries, not only locally but elsewhere, have secured him a high reputation; he also has been liberal with information.

The name of Mr. R. Tudor, of Bootle, must always be associated with the zoology of the neighbourhood as the original discoverer of many species.

Mr. W. H. Weightman has been good enough to contribute by his researches amongst *Entomostraca*.

Mr. W. Webster's intimate knowledge of birds, mollusca, &c. has been freely imparted, and of much assistance.

I am much indebted to the talented authors of the "British Nudibranchiate Mollusca;" to Mr. Alder, for correspondence always prompt and valuable; and to Mr. Hancock, for the very faithful drawing of "*Antiope Hyalina*," a coloured engraving of which, by Mr. Tuffin West, forms part of the volume.

To Drs. Dickinson and Inman, Messrs. Parke, Whitehead, N. Cooke, and others, my thanks are due for useful contributions or advice.

It is a reasonable expectation that further investigations by those gentlemen who have hitherto followed natural history pursuits, may add sufficient for a large appendix to the present instalment at some future time. The physical conditions of a neighbourhood of course modify and determine the character of the animal and vegetable productions on its surface and in its waters. I refer with pleasure to the excellent chapter upon the physical geography of the district, which is suitably placed as a preliminary to Dr. Dickinson's Flora; the remarks therein contained are equally applicable to the present object.

# ANIMALIA.

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## SUB-KINGDOM VERTEBRATA.

### CLASS 1.—MAMMALIA.

#### *Order* CHEIROPTERA—BATS.

##### *Family* VESPERTILIONIDÆ.

###### *Genus* VESPERTILIO.

###### VESPERTILIO NOCTULA—NOCTULE.

Mr. Mather, taxidermist, of Williamson-square, remembers having stuffed specimens, taken from Birkenhead Abbey, many years ago, before the additional building; once or twice also from other localities. If now in the neighbourhood it is very scarce.

###### VESPERTILIO PIPISTRELLUS. Common Bat, Flitter-mouse, Pipistrelle.

The most common bat of the district. A living specimen was given to me so late in the year as the month of December, 1852.

###### VESPERTILIO DAUBENTONII. Daubenton's Bat.

Taken by Mr. Nicholas Cooke from a hollow tree in Delamere Forest. He was out with a party of entomologists, and caught nine out of two or three dozen, which were disturbed in their lurking place. A specimen was sent to the British Museum, and there named.

###### *Genus* PLECOTUS.

###### PLECOTUS AURITUS. Long-eared Bat.

Almost equally common during the warm months.

##### *Family* RHINOLOPHIDÆ.

###### *Genus* RHINOLOPHUS.

###### RHINOLOPHUS HIPPOSIDEROS. Lesser horse-shoe bat.

One from Storeton quarry, stuffed by Mr. Mather, 20 years ago.

THE FAUNA OF LIVERPOOL.

*Order* INSECTIVORA.

*Family* ERINACEIDÆ.

*Genus* ERINACEUS.

ERINACEUS EUROPÆUS. Hedge-hog. Urchin.

Common everywhere in rural districts.

*Family* TALPIDÆ.

*Genus* TALPA.

TALPA VULGARIS. Mole. Moldwarp. Want.

Too common.

*Family* SORICIDÆ.

*Genus* SOREX.

SOREX ARANEUS. Common Shrew. Shrew-mouse.

Very general.

SOREX FODIENS. Water Shrew.

Taken at Egremont.—*Mr. R. Abbott.*

SOREX REMIFER. Oared Shrew.

Caught at Upton by *Mr. Webster*, 1851.

*Order* CARNIVORA.

*Family* URSIDÆ.

*Genus* MELES.

MELES TAXUS. The Badger.

One killed in a sand-hole at Poole Hall Farm, adjoining Hooton, five years ago.—*Mr. Grace.* I can hear of instances of their capture, many years back, at Oxtan Hill, also at Caldby and Moston Hall.

*Family* MUSTELIDÆ.

*Genus* LUTRA.

LUTRA VULGARIS. Common Otter.

Has been seen within a few years back in the Chester and Ellesmere Canal, and in Stanney Mill Brook, which is an arm of the Gowy River.—*Mr. Grace.* Also in the Alt, near Sephton, ten or twelve years ago.—*Mr. Mather.*

*Genus* MUSTELA.

MUSTELA VULGARIS. Common Weasel.

In rural districts everywhere.

MUSTELA ERMINEA. Ermine-Weasel. Stoat.

Common.

MUSTELA PUTORIUS. Fitchet Weasel. Polecat.

Occasionally found in Wirral and Lancashire; formerly common. A specimen was partially tamed by *Mr. Grace*, of Whitby Hall, and lived with his ferrets.

MUSTELA FURIO. The Ferret Weasel.

Kept, where required, for hunting purposes.

THE FAUNA OF LIVERPOOL.

*Genus* MARTES.

MARTES FOINA. Common Marten. Beech Marten.

Twelve or fifteen years ago a "Marten Cat" was killed by John Robinson, one of the Marquis of Westminster's keepers, in the Township of Whitby.—*Mr. Grace*. Another, caught about Hooton, was sent fifteen years ago by the late Sir Thomas Stanley to Mr. Mather for stuffing.

*Family* FELIDÆ.

*Genus* FELIS.

FELIS CATUS. (Var. Domestica.) Cat.

Common.

*Family* CANIDÆ.

*Genus* CANIS.

CANIS FAMILIARIS. The Dog.

Common.

*Genus* VULPES.

VULPES VULGARIS. Common Fox.

Not so strictly preserved for hunting as formerly, and therefore not now abundant.

*Family* PHOCIDÆ.

*Genus* PHOCA.

PHOCA VITULINA. Common Seal. Sea Calf.

There are instances of their occasional capture in the Dee, Mersey, and neighbouring parts of the coast.

*Order* RODENTIA.

*Family* SCIURIDÆ.

*Genus* SCIURUS.

SCIURUS VULGARIS. Common Squirrel.

Knowsley Park.

*Genus* MYOXUS.

MYOXUS AVELLANARIUS. Common Dormouse.

Sparingly in the neighbourhood.—*Mr. Mather*. Mr. Brockholes has seen it in Prenton Wood.

*Family* MURIDÆ.

*Genus* MUS.

MUS MESSORIUS. Harvest Mouse.

Not unfrequent in wheat stacks, barns, and fields.

MUS SYLVATICUS. Long-tailed Field Mouse. Wood Mouse.

Common.

MUS MUSCULUS. Common Mouse.

Everywhere. Too common.

MUS RATTUS. Black Rat.

Abundant on shipboard; occasional stragglers ashore.

MUS DECUMANUS. Brown Rat. Norway Rat.

Common nuisances.



THE FAUNA OF LIVERPOOL.

*Family* CASTORIDÆ.

*Genus* ARVICOLA.

ARVICOLA AMPHIBIUS. Water Vole. Water Rat.

About pits and ditches everywhere.

ARVICOLA AGRESTIS. Short-tailed Field Mouse. Meadow Mouse  
Common.

ARVICOLA PRATENSIS? Bank Vole.

Mr. R. Abbott thinks he has seen specimens of this species at Egremont; not  
captured.

*Family* LEPORIDÆ.

*Genus* LEPUS.

LEPUS TIMIDUS. Common Hare.

Common.

LEPUS CUNICULUS. Rabbit. Coney.

Common.

*Genus* CAVIA.

CAVIA APEREA. Restless Cavy. Guinea Pig.

Occasionally, in captivity.

*Order* PACHYDERMATA.

*Family* SUIDÆ.

*Genus* SUS.

SUS SCROFA. Common Hog.

Common.

*Family* EQUIDÆ.

*Genus* EQUUS.

EQUUS CABALLUS. Horse.

Common.

*Genus* ASINUS.

ASINUS VULGARIS. The Ass.

Common.

*Order* RUMINANTIA.

*Family* BOVIDÆ.

*Genus* BOS.

BOS TAURUS. The Ox.

Common.

*Family* CAPRIDÆ.

*Genus* CAPRA.

CAPRA HIRCUS. Common Goat.

Common for domestic use.

*Genus* OVIS.

OVIS ARIES. Common Sheep.

Common.

*Order* CETACEA.

*Family* DELPHINIDÆ.

*Genus* PHOCÆINA.

*PHOCÆINA COMMUNIS.* Common Porpoise.

Frequent in shoals during stormy and changeable weather.

*Genus* HYPEROODON.

*HYPEROODON BUTZKOPF.* Bottle-head.

One stranded upon East Hoyle Bank, 1850, and exhibited at Tranmere Slip, after which it was cut up at Hoylake, and 140 gallons of oil obtained from its blubber. The stomach contained great numbers of the horny beaks of some species of cuttle. Although these have been found frequently in the stomachs of whales, in this instance the mode of their arrangement was remarkable, as the beaks were inserted one within another, so as to ride, regularly imbricated, in rows of ten, fifteen, or twenty together. I have pulled as many as seven asunder, and the person who took them from the stomach informed me that they formed rows, in some instances, of an inch and a-half in length. Many were so firmly impacted that they required strong traction to separate them, and sometimes they would break rather than come asunder. This curious arrangement must have been brought about by the peristaltic movements of the stomach.

Another specimen was captured at the Little Moels two years ago.

August 25, 1853, a male of this species was stranded upon East Hoyle Bank; its length was 21 feet; from the angle of the mouth to the tip of the snout, 20 inches; from tip of snout to eye, 3 feet 6 inches; eye to spiracle, 2 feet 3 inches. The pectoral fins were 1 foot 9 inches long, and 9 inches broad; tail fin or propeller, 5 feet 6 inches broad, and 2 feet long; the dorsal fin about 10 or 11 feet from the tail; from the vent to the tail, 7 feet 6 inches; orifice of urethra to anal opening, 1 foot 10 inches; the length of the snout was 1 foot 3 inches. I had an opportunity of seeing the stomach opened, and observed great numbers, certainly many hundreds, of the cuttle beaks; many were unattached, but others were placed one within another, as in the foregoing instance.

Another of the same species, probably his female mate, was seen swimming about the same locality for three weeks after his capture, and was driven by three fishing boats upon the same bank, which, however, was covered with sufficient water to enable it to "flounder off."

CLASS II.—AVES.

Order RAPTORES.

Family FALCONIDÆ.

Genus HALIÆTUS.

HALIÆTUS ALBICILLA.

Seen at Leasowe, shot at and wounded.—*Mr. Brockholes*. Both Messrs. *Mather* and *Butterworth* have had them from the neighbourhood for stuffing.

Genus PANDION.

PANDION HALIÆTUS. Osprey, Fishing-hawk.

Shot at Formby five years ago, and once since.—*Mr. Mather*.

Genus FALCO.

FALCO PEREGRINUS. Peregrine Falcon.

Seen on the wing at New Brighton by *Mr. Price*. *Mr. Mather* has stuffed specimens shot near Liverpool.

FALCO SUBBUTEO. The Hobby.

Specimen shot at Knowsley; in the Derby Museum. One at Crosby.—*Mr. Mather*.

FALCO ÆSALON. The Merlin.

Wirral and Lancashire; in winter rarely. One shot at West Kirby, October, 1853.

FALCO TINNUNCULUS. Kestrel or Windhover.

Very common.

Genus ACCIPITER.

ACCIPITER NISUS. The Sparrow-hawk.

Very general.

Genus BUTEO.

BUTEO VULGARIS. Common Buzzard.

About Wirral and Lancashire, occasionally, but not common.

BUTEO LAGOPUS. Rough-legged Buzzard.

Several, both on this and the Cheshire side of the Mersey.—*Mr. Mather*. Bickerstaff and Knowsley.

Genus PERNIS.

PERNIS APIVORUS. Honey Buzzard.

A dozen at least from about the district of St. Helens, Aintree Race-ground, and elsewhere.—*Mr. Mather*. Rainford, 1835.

Genus CIRCUS.

CIRCUS ÆRUGINOSUS. The Marsh Harrier.

In the rabbit-warrens about Crosby and Formby, and probably on the Cheshire side also.—*Mr. Mather*.

CIRCUS CYANEUS. The Hen-harrier.

Has been shot in many places, but is becoming less plentiful.

CIRCUS MONTAGUI. Montague's Harrier.

One from Bidston Marsh.—*Mr. Mather*.

THE FAUNA OF LIVERPOOL.

*Family* STRIGIDÆ.

*Genus* OTUS.

OTUS VULGARIS. Long-eared Owl.

Uncommon.

OTUS BRACHYOTUS. Short-eared Owl.

Not uncommon, especially in winter.

*Genus* STRIX.

STRIX FLAMMEA. The White or Barn Owl.

Equally common with the last species, and breeds in the neighbourhood.

*Genus* SYRNIUM.

SYRNIUM STRIDULA. The Tawny Owl.

Breeds in Stanley's Wood at Eastham.—*Mr. Mather.*

*Order* INSESSORES.

*First Division.*—DENTIROSTRES.

*Family* LANIADÆ.

*Genus* LANIUS.

LANIUS EXOUBITOR. Great Grey Shrike.

Whitby Locks.—*Mr. Grace.* Crosby, rare. One caught some years ago striking at a noose set for larks in the winter.

LANIUS COLLURIO. Red-backed Shrike.

*Mr. Mather* states that he has about one specimen a year for stuffing. Breeds at Bootle.

*Family* MUSCICAPIDÆ.

*Genus* MUSCICAPA.

MUSCICAPA GRISOLA. Spotted Fly-catcher.

Common.

*Family* MERULIDÆ.

*Genus* TURDUS.

TURDUS VISCIVORUS. The Missel Thrush.

Very general.

TURDUS PILARIS. Field-fare, locally blue-back.

Equally if not more common.

TURDUS MUSICUS. The Song Thrush.

Very common.

TURDUS ILIACUS. The Redwing.

Common.

TURDUS MERULA. The Blackbird.

Very common. White, mottled, and cream-coloured varieties are met with occasionally.

TURDUS TORQUATUS. The Ring Ousel.

Two specimens shot in 1852 at Hoylake—one during the time of the vernal and the other of the autumnal migration. Crosby. Probably not uncommon.

THE FAUNA OF LIVERPOOL.

Family SYLVIADÆ.

Genus ACCENTOR.

ACCENTOR MODULARIS. The Hedge Accentor or Hedge Sparrow.  
Everywhere.

Genus ERYTHRACA.

ERYTHRACA RUBECULA. The Redbreast.

Very common.

Genus PHÆNICURA.

PHÆNICURA RUTICILLA. The Redstart.

Occasional in Spring and Autumn. Breeds in the district.

PHÆNICURA TITHYS. The Black Redstart.

One killed near the Dingle in the winter.—*Mr. Butterworth*. A male at Storeton Quarry three years ago.—*Mr. Mather*.

Genus SAXICOLA.

SAXICOLA RUBICOLA. The Stonechat.

Not uncommon on moorish land, some few remaining over the winter.

SAXICOLA RUBETRA. The Whinchat.

Frequent in summer—builds.

SAXICOLA ŒNANTHE. The Wheatear.

Pretty general, but found especially upon the sand hills round the coast.

Genus SALICARIA.

SALICARIA LOCUSTELLA. Grasshopper Warbler.

Seen by *Mr. Price*. Bebbington and Bidston.—*Mr. Brockholes*.

SALICARIA PHRAGMITIS. Sedge Warbler.

Frequent in marshy places and at the borders of ponds.

Genus CURRUCA.

CURRUCA CINEREA. The Common Whitethroat.

Very common.

CURRUCA SYLVIELLA. The Lesser Whitethroat.

Have bred at Egremont, where they have been taken.—*Mr. R. Abbott*.

Genus SYLVIA.

SYLVIA SYLVICOLA. The Wood Warbler.

Seen in Wirral occasionally—scarce.

SYLVIA TROCHILUS. The Willow Warbler.

Common.

SYLVIA HIPPOLAIS. The Chiff-Chaff.

A specimen shot at Upton, 1852. Very scarce.—*Mr. Webster*. More plentiful at New Brighton.—*Mr. R. Abbott*.

Genus REGULUS.

REGULUS CRISTATUS. The Golden-crested Regulus.

Not uncommon—breeds in the neighbourhood now and then. Common in Cloughton firwoods in winter.—*Mr. Brockholes*.

THE FAUNA OF LIVERPOOL.

*Family* PARIDÆ.

*Genus* PARUS.

PARUS MAJOR. The Great Tit.

Common.

PARUS CÆRULEUS. The Blue Tit.

Very common.

PARUS ATER. The Cole Tit.

Occasional in winter.

PARUS PALUSTRIS. The Marsh Tit.

Not unfrequent—breeds occasionally here.

PARUS CAUDATUS. Long-tailed Tit.

Not uncommon in the winter time, flying generally in families of from eight to twenty—breeds.

*Family* AMPELIDÆ.

*Genus* BOMBYCILLA.

BOMBYCILLA GARRULA. Bohemian Waxwing.

Ormskirk, 1851.—*Mr. Butterworth*. Cheshire. Aigburth. Occasional, but rare.

*Family* MOTACILLIDÆ.

*Genus* MOTACILLA.

MOTACILLA YABRELLII. The Pied Wagtail.

Very general.

MOTACILLA BOARULA. The Grey Wagtail.

Seen now and then on their passage.

MOTACILLA FLAVA. Ray's Wagtail. Yellow Wagtail.

Common; generally breeding in corn fields.

*Family* ANTHIDÆ.

*Genus* ANTHUS.

ANTHUS ARBOREUS. The Tree Pipit.

Not unfrequent—breed about the district.

ANTHUS PRATENSIS. The Meadow Pipit.

Not uncommon, a few staying the winter—breed here.

ANTHUS PETROSUS. The Rock Pipit.

Thinly scattered along the coast.

ANTHUS RICARDI. Richard's Pipit.

The Rev. T. Staniforth kindly communicates that he has a stuffed specimen.

The bird was killed at Crosby.

*Second Division*.—CONIROSTRES.

*Family* ALAUDIDÆ.

*Genus* ALAUDA.

ALAUDA ARVENSIS. The Skylark.

Very common. A drab or cream-coloured variety shot at Newton-cum-Larton.

ALAUDA ARBOREA. The Woodlark.

Plentiful twenty years ago; now never seen—*Mr. Mather*.

THE FAUNA OF LIVERPOOL.

*Family* EMBERIZIDÆ.

*Genus* PLECTROPHANES.

PLECTROPHANES NIVALIS. The Snow Bunting.

Seen occasionally, especially along the coast, and in hard weather. Often in company with larks.

*Genus* EMBERIZA.

EMBERIZA MILIARIA. Common Bunting.

Sometimes in summer, more commonly in winter.

EMBERIZA SCHCENICULUS. Black-headed Bunting.

Very general.

EMBERIZA CITRINELLA. Yellow Bunting. Yellow Ammer.

Common.

*Family* FRINGILLIDÆ.

*Genus* FRINGILLA.

FRINGILLA CÆLEBS. The Chaffinch.

Common.

FRINGILLA MONTIFRINGILLA. Mountain Finch, or Bramble Finch.

Mr. Mather informs me that he has specimens now and then, and that it is not uncommon some seasons.

*Genus* PASSER.

PASSER MONTANUS. The Tree Sparrow.

Several at different times.—Mr. Mather.

PASSER DOMESTICUS. The House Sparrow.

Common.

*Genus* COCCOTHAUSTES.

COCCOTHAUSTES CHLORIS. The Greenfinch. Green Grosbeak.

Very common.

*Genus* CARDUELIS.

CARDUELIS ELEGANS. The Goldfinch.

Not very frequent.

CARDUELIS SPINUS. The Siskin or Aberdevine.

Seen in hard weather, principally frequenting alder trees; often in company with flocks of the lesser Redpole.—Mr. Webster.

*Genus* LINOTA.

LINOTA CANNABINA. Common Linnet.

Not uncommon.

LINOTA LINARIA. The Lesser or Common Redpole.

In flocks in winter. A few breed.—Mr. Webster. Also in the summer months about New Brighton.—Mr. R. Abbott.

*Genus* PYRRHULA.

PYRRHULA VULGARIS. The Bullfinch.

A few breed every season.

THE FAUNA OF LIVERPOOL.

*Genus LOXIA.*

**LOXIA CURVIROSTRA.** Common Crossbill.

Shot in the neighbourhoods of Chester, Bidston, and elsewhere, where there are fir trees.—*Mr. Brockholes.*

*Family STURNIDÆ.*

*Genus STURNUS.*

**STURNUS VULGARIS.** Common Starling.

Very common.

*Genus PASTOR.*

**PASTOR ROSEUS.** The Rose-coloured Pastor.

Killed near Liverpool 16 or 17 years ago, and stuffed by Mr. Mather.

*Family CORVIDÆ.*

*Genus FREGILUS.*

**FREGILUS GRACULUS.** The Chough. Red-legged Crow.

Once at Crosby; here very rarely.—*Mr. Mather.*

*Genus CORVUS.*

**CORVUS CORAX.** The Raven.

Occasionally in Wirral.

**CORVUS CORONE.** The Carrion Crow.

Not very abundant.

**CORVUS CORNIX.** The Hooded Crow, or Royston Crow.

Shore north of Wirral.—*Mrs. Longueville.* Occasionally in winter.

**CORVUS FRUGILEGUS.** The Rook.

Very common everywhere.

**CORVUS MONEDULA.** The Jackdaw.

A few about Wirral. Pairs frequent Bebbington, Eastham, and doubtless other country churches.

*Genus PICA.*

**PICA CAUDATA.** The Magpie.

Very common.

*Genus GARRULUS.*

**GARRULUS GLANDARIUS.** The Jay.

Knowsley Park.—*Mr. S. Archer.* Formerly common in Wirral, but now scarce.

Eastham. In a firwood between Rock Ferry and Bebbington.—*Mr. Brockholes.*

*Third Division.—SCANSORES.*

*Family PICIDÆ.*

*Genus PICUS.*

**PICUS VIRIDIS.** The Green Woodpecker.

One at New Brighton. Rare about the district.

**PICUS MAJOR.** The Great Spotted Woodpecker.

About Ormskirk. Knowsley.

**PICUS MINOR.** The Lesser Spotted Woodpecker.

Wood near Bromborough Pool.



*Genus* YUNX.

YUNX TORQUILLA. The Wryneck.

Very rare in Wirral. Has bred at Saughall-Massie.—*Mr. Webster.*

*Family* CERTHIADÆ.

*Genus* CERTHIA.

CERTHIA FAMILIARIS. Common Creeper.

Not common at the north of Wirral. Claughton firwoods.—*Mr. Brockholes.*  
Dingle and North Shore.—*Mr. Mather.*

*Genus* TROGLODYTES.

TROGLODYTES VULGARIS. The Wren.

Common.

*Genus* UPUPA.

UPUPA EPOPS. The Hoopoe.

Four shot at Knowsley; in the Derby Museum.—*Mr. R. Abbott.* One at Edge Hill. At Formby and elsewhere.—*Mr. Mather.* Hoylake.—*Rev. T. Staniforth.*

*Family* CUCULIDÆ.

*Genus* CUCULUS.

CUCULUS CANORUS. The Common Cuckoo.

Common.

*Fourth Division.*—FISSIROSTRES.

*Family* MEROPIDÆ.

*Genus* CORACIAS.

CORACIAS GARRULA. The Roller.

One shot at Knotty Ash was stuffed by *Mr. Mather*, and is now at his house.

*Family* HALCYONIDÆ.

*Genus* ALCEDO.

ALCEDO ISPIDA. King-fisher.

Not very uncommon.

*Family* HIRUNDINIDÆ.

*Genus* HIRUNDO.

HIRUNDO RUSTICA. The Swallow.

Very common.

HIRUNDO URBICA. The Martin.

Equally frequent.

HIRUNDO RIPARIA. The Sand Martin, or Bank Martin.

Locally in great numbers.

*Genus* CYPSELUS.

CYPSELUS APUS. The Common Swift.

General.

CYPSELUS ALPINUS. The Alpine Swift.

One only, killed at the mouth of the Dee many years ago by — *Mostyn, Esq.*

—*Mr. Mather.*

THE FAUNA OF LIVERPOOL.

*Family* CAPRIMULGIDÆ.

*Genus* CAPRIMULGUS.

CAPRIMULGUS EUROPEUS. The Nightjar.

Generally distributed in heaths and woody places.

*Order* RASORES.

*Family* COLUMBIDÆ.

*Genus* COLUMBA.

COLUMBA PALUMBUS. Ring Dove, or Wood Pigeon. Cushat.

Very common.

COLUMBA TURTUR. The Turtle Dove.

One shot at Bidston-cum-Ford, 1851.—*Mr. Webster.* Several at different times.

*Mr. Mather.*

*Family* PHASIANIDÆ.

*Genus* PHASIANUS.

PHASIANUS COLCHICUS. Common Pheasant.

Common.

*Family* TETRAONIDÆ.

*Genus* TETRAO.

TETRAO TETRIX. The Black Grouse.

Has been shot at Kirby Moss.

*Genus* LAGOPUS.

LAGOPUS SCOTICUS. The Red Grouse.

One shot at West Kirby some years ago by *Mr. Robin.* A pair once in Cloughton firwood. Once at Ormskirk.—*Mr. Mather.*

*Genus* PERDIX.

PERDIX CINEREA. Common Partridge.

Very common.

*Genus* COTURNIX.

COTURNIX VULGARIS. Common Quail.

A few every season.

*Order* GRALLATORES.

*Family* CHARADRIIDÆ.

*Genus* ŒDICNEMUS.

ŒDICNEMUS CREPITANS. The Great Plover. Norfolk Plover, or Stone Curlew.

Said to have been seen on the Hoylake shore. Formby. Ormskirk.—*Mr. Mather.*

*Genus* CHARADRIUS.

CHARADRIUS MORINELLUS. The Dotterell.

A few every spring.

CHARADRIUS HIATICULA. The Ringed Plover.

Very common. Breeds along the shore.

THE FAUNA OF LIVERPOOL.

*Genus* SQUATORALA.

SQUATORALA CINEREA. The Grey Plover.

Abundant in winter.

*Genus* VANELLUS.

VANELLUS CRISTATUS. Peewitt. Lapwing.

In large flocks.

*Genus* STREPELAS.

STREPELAS INTERPRES. The Turnstone.

Occasionally seen, but not frequent.

*Genus* CALIDRIS.

CALIDRIS ARENARIA. The Sanderling.

Seen now and then in flocks round the coast.

*Genus* HÆMATOPUS.

HÆMATOPUS OSTRALÉGUS. Oyster Catcher, or Sea Pie.

Very frequent.

*Family* ARDEIDÆ.

*Genus* ARDEA.

ARDEA CINEREA. The Common Heron.

Numerous. A heronry at Hooton. A pair bred at Newton-cum-Larton some years ago.

*Genus* BOTAURUS.

BOTAURUS MINUTUS. The Little Bittern.

Shot at Aigburth, January, 1854.—*Mr. Butterworth.*

BOTAURUS STELLARIS. The Common Bittern.

Shot at Upton, Bidston Marsh, Hoylake, Irby, &c.

*Genus* NYCTICORAX.

NYCTICORAX GARDENI. The Night Heron.

Near Ormskirk. Mr. Mather remembers two or three instances of its having been shot within the last twenty years.

*Family* SCOLOPACIDÆ.

*Genus* NUMENIUS.

NUMENIUS ARQUATA. The Common Curlew.

Abundant in winter.

NUMENIUS PHŒOPUS. The Whimbrel.

Frequents the coast in winter and the pasture-fields in spring, before going to its breeding quarters.

*Genus* TOTANUS.

TOTANUS CALIDRIS. Common Redshank.

Pretty frequent round the coast.

TOTANUS OCHROPUS. Green Sandpiper.

Shot at Cuerdley Marsh, 1851.

TOTANUS GLAREOLA. The Wood Sandpiper.

North Shore.—*Mr. Nicholas Cooke.*

THE FAUNA OF LIVERPOOL.

**TOTANUS HYPOLEUCOS.** Common Sandpiper. Summer Snipe.

A few pairs breed on the banks of most of the streams every year.

**TOTANUS MACULARIUS.** The Spotted Sandpiper.

Once on Formby Shore.—*Mr. Mather.*

**TOTANUS GLOTTIS.** The Greenshank.

Not uncommon on the coast.

*Genus LIMOSA.*

**LIMOSA RUF.** The Bar-tailed Godwit.

Pretty frequent.

*Genus MACHETES.*

**MACHETES PUGNAX.** The Ruff. Female Reeve.

A Reeve shot at West Kirby, October, 1852. Moss near Kirby.—*Mr. Mather.*

*Genus SCOLOPAX.*

**SCOLOPAX RUSTICOLA.** The Woodcock.

Not unfrequent.

**SCOLOPAX MAJOR.** The Great Snipe.

Twice at Upton, also several times at Hoylake.

**SCOLOPAX GALLINAGO.** The Common Snipe.

Very abundant.

**SCOLOPAX GALLINULA.** The Jack Snipe.

Equally common.

*Genus TRINGA.*

**TRINGA SUBARQUATA.** The Curlew Sandpiper, or Pigmy Curlew.

Waterloo, Formby, and about the mouth of the Alt.—*Mr. Mather.*

**TRINGA CANUTUS.** The Knot.

A few flocks may be seen every season along the coast.

**TRINGA RUFESCENS.** The Buff-breasted Sandpiper.

A stuffed specimen is in the possession of the Rev. Thomas Staniforth, the bird having been killed at Formby, and sent to the Liverpool market among Snipes, 1829. See "Yarrell's British Birds," vol. 3, p. 58.

**TRINGA MINUTA.** Little Stint.

Seen most years on the Cheshire and Lancashire shores.—*Mr. Mather.*

**TRINGA VARIABILIS.** The Dunlin.

Abundant round the coast, rarely inland; in flocks during hard weather.

*Family RALLIDÆ.*

*Genus CREX.*

**CREX PRATENSIS.** Landrail, or Corn-crake.

Breeds freely in meadows and clover fields.

**CREX PORZANA.** The Spotted Crake.

Three specimens shot in the autumn of 1852, at Hoylake. Kirby Moss.

**CREX PUSILLA.** The Little Crake, or Olivaceous Gallinule.

One specimen from Crosby.—*Mr. Mather.*

THE FAUNA OF LIVERPOOL.

*Genus RALLUS.*

**RALLUS AQUATICUS.** The Water Rail.

Pretty common, mostly in winter.

*Genus GALLINULA.*

**GALLINULA CHLOROPUS.** Moor Hen. Water Hen.

Very common.

*Family LOBIPEDIDÆ.*

*Genus FULICA.*

**FULICA ATRA.** The Common Coot.

Occasionally met with.

*Genus PHALAROPUS.*

**PHALAROPUS LOBATUS.** The Grey Phalarope.

One from Crosby stuffed by Mr. Butterworth. Occasionally shot at the Old Swan and elsewhere.—*Mr. Mather.*

**PHALAROPUS HYPERBOREAS.** The Red-necked Phalarope.

One specimen from a pit in Cheshire.—*Mr. Mather.*

*Order NATATORES.*

*Family ANATIDÆ.*

*Genus ANAS.*

**ANAS SEGETUM.** The Bean Goose.

Has been frequently shot.

*Genus ANSER.*

**ANSER BRACHYRHYNCHUS.** The Pink-footed Goose.

Shot at Ceurdley.

**ANSER LEUCOPSIS.** The Bernicle Goose.

Very common in winter.

**ANSER TORQUATUS.** The Brent Goose.

Occasionally seen.

*Genus CYGNUS.*

**CYGNUS FERUS.** The Hooper, or Whistling Swan.

Was seen in meadows at Upton, a few years ago. Between Leasowe and the Carr, 1853.—*Mr. Brockholes.*

**CYGNUS OLOR.** The Mute Swan.

Half domesticated, about ornamental waters.

*Genus TADORNA.*

**TADORNA VULPANSER.** The Shelldrake. Burrow Duck.

Not uncommon about the Dee. Breeds occasionally in the rabbit warrens of the coast, and in the Middle Hilbre Island.

*Genus ANAS.*

**ANAS CLYPEATA.** The Shoveler. Blue-winged Shoveler, or Broadbill.

Shot at Hoylake.

THE FAUNA OF LIVERPOOL.

**ANAS ACUTA.** The Pintail Duck.

Has been shot several times both at Upton and Hoylake.

**ANAS BOSCHAS.** The Wild Duck.

Common. Breeds occasionally in the vicinity of ponds. There is a duck decoy at Hale.

**ANAS QUERQUEDULA.** Garganey Teal.

One specimen at Ormskirk.—*Mr. Mather.*

**ANAS CRECCA.** The Teal.

Very common.

**ANAS PENELOPE.** The Wigeon.

Common.

*Genus SOMATERIA.*

**SOMATERIA MOLLISSIMA.** The Eider Duck, or St. Cuthbert's Duck.

One killed near the Potteries, three years ago, in stormy November weather.—*Mr. Mather.*

*Genus OIDEZIA.*

**OIDEZIA NIGRA.** The Common Scoter.

Very abundant about the sandbanks.

*Genus FULIGULA.*

**FULIGULA FERINA.** Pochard, or Dunbird.

Rare, but has been shot near Hoylake in flooded meadows. One caught in a field near Upton and kept amongst ducks.—*Mr. Webster.*

**FULIGULA NYROCA.** The Ferruginous Duck. The White-eyed Duck.

Shot at Newton-cum-Larton, opposite the New House Farm, November, 1853 ; also by Mr. Banks at Weston, near Runcorn, January, 1854.

**FULIGULA MARILA.** The Scaup Duck.

Equally as rare as the Pochard, but shot under the same circumstances.

**FULIGULA CRISTATA.** The Tufted Duck.

Knowsley, 1847.—*Mr. S. Archer.* Occasional specimens from the neighbourhood stuffed by Mr. Mather.

**FULIGULA CLANGULA.** The Golden Eye.

Abundant in severe weather about Hoylake and other parts of the coast.

*Genus MERGUS.*

**MERGUS ALBELLUS.** The Smew.

Rare in hard weather. One taken at Tranmere. Weston, near Runcorn ; shot by Mr. Banks, January, 1854.

**MERGUS SERRATOR.** The Red-breasted Merganser.

Taken rarely in severe winters.—*Mr. Mather.*

**MERGUS MERGANSER.** Goosander.

In severe weather occasionally.

*Family COLYMBIDÆ.*

*Genus PODICEPS.*

**PODICEPS CRISTATUS.** The Great-crested Grebe.

Often taken on the river in severe winter seasons.—*Mr. Mather.* Weston, near Runcorn, January 7th, 1854.—*Mr. Banks.*

THE FAUNA OF LIVERPOOL.

**PODICEPS AURITUS.** The Eared Grebe.

A stuffed specimen at Oxtou, which had been shot upon the Mersey shore near Tranmere.

**PODICEPS MINOR.** The Little Grebe. Dabchick.

Occasional. Bootle and elsewhere.

*Genus* COLYMBUS.

**COLYMBUS GLACIALIS.** The Great Northern Diver.

Once shot at Hilbre Island.—*R. Barton, Esq.*

**COLYMBUS SEPTENTRIONALIS.** The Red-throated Diver.

Seen every winter along the coast.

*Family* ALCIDÆ.

*Genus* URIA.

**URIA TROILE.** The Common Guillemot.

By no means uncommon around the coast after the breeding season.

*Genus* MERGULUS.

**MERGULUS MELANOLEUCOS.** The Little Auk, or Common Rotche.

In the Mersey.—*Mr. Brockholes.* Garston. Now and then seen in severe October or November weather.—*Mr. Mather.*

*Genus* FRATERCULA.

**FRATERCULA ARCTICA.** The Puffin, or Sea Parrot.

*Mr. Butterworth* has stuffed several; some taken as far up the Mersey as Runcorn.

*Genus* ALCA.

**ALCA TORDA.** The Razor Bill.

Rather rare. Shot at Hilbre, and seen everywhere round the shores now and then.

*Family* PELECANIDÆ.

*Genus* PHALACROCORAX.

**PHALACROCORAX CARBO.** The Common Cormorant.

Very numerous upon the sandbanks.

**PHALACROCORAX GRACULUS.** The Shag, or Green Cormorant.

Met with in several instances at the end of the year, after the breeding season.—*Mr. Mather.*

*Genus* SULA.

**SULA ALBA.** The Gannet, or Soland Goose.

Not unfrequent; following shoals of fish.

*Family* LARIDÆ.

*Genus* STERNA.

**STERNA BOYSII.** The Sandwich Tern.

One shot on Bootle shore.—*Mr. Butterworth.* Two at Crosby. Very rare.—*Mr. Mather.*

**STERNA HIRUNDO.** Common Tern, or Sea Swallow.

Common about the coast.

THE FAUNA OF LIVERPOOL.

**STERNA MINUTA.** The Lesser Tern.

Not uncommon on the Wirral and Lancashire coast.

**STERNA FISSIPES.** The Black Tern.

Rare. Killed at Bootle. Occasionally seen on their passage.—*Mr. Mather.*

*Genus* **LARUS.**

**LARUS MINUTUS.** The Little Gull.

One killed near New Ferry. Another at Formby. Rare.

**LARUS RIDIBUNDUS.** The Black-headed Gull.

Pretty frequent.

**LARUS TRIDACTYLUS.** The Kittiwake Gull.

Very common.

**LARUS CANUS.** The Common Gull.

Very abundant, frequenting meadows in stormy weather.

**LARUS FUSCUS.** The Lesser Black-backed Gull.

Rather scarce. A specimen caught upon a cod hook at Hoylake, 1852.

**LARUS ARGENTATUS.** The Herring Gull.

More common than the foregoing.

**LARUS MARINUS.** The Great Black-backed Gull.

Crosby.—*Mr. Butterworth.* Rarely shot, though often seen in flocks. *Mr.*

*Mather* has had one about every March for three years.

*Genus* **LESTRIS.**

**LESTRIS CATARRACTES.** The Common Skua.

Seen occasionally. One shot at Bidston-cum-Ford, as he was making an attack upon some chickens.

**LESTRIS POMARINUS.** The Pomerine Skua.

Shot at Hoylake, September, 1852, by *Mr. H. Crump.*

**LESTRIS RICHARDSONI.** Richardson's Skua.

Shot in the river Mersey several times.—*Mr. Mather.*

*Genus* **PROCELLARIA.**

**PROCELLARIA GLACIALIS.** The Fulmar Petrel.

At Wallasey, 1854, in stormy weather during the spring.

*Genus* **THALASSIDROMA.**

**THALASSIDROMA LEACHII.** The Forked-tailed Petrel.

Has been often found. Two kept alive for three days by *Mr. Mather.*

**THALASSIDROMA PELAGICA.** The Storm Petrel.

Seen in stormy weather every winter.



CLASS 3.—REPTILIA.

Order SQUAMATA, (SAURIA.)

Family LACERTADÆ.

Genus LACERTA.

LACERTA AGILIS. Sand Lizard.

On the sand hills from West Kirby to New Brighton. At Seaforth, Crosby, and elsewhere.

Genus ZOOTOCA.

ZOOTOCA VIVIPARA. Viviparous Lizard. Common Lizard.

Bidston hill. Probably general.

Order SQUAMATA, (SAUROPHIDÆ.)

Family ANGUIDÆ.

Genus ANGUIS.

ANGUIS FRAGILIS. Blind Worm. Slow Worm.

At Bidston Hill, and most likely not rare in the district.

Order SQUAMATA, (OPHIDIA.)

Family COLUBRIDÆ.

Genus NATRIX.

NATRIX TORQUATA. Ringed Snake. Common Snake.

Not uncommon, though less frequent in Wirral now than formerly.

Family VIPERADÆ.

Genus PELIAS.

PELIAS BERUS. Common Viper. Adder.

One killed at Leasowe a few years ago.—*Mrs. Longueville*. At Kirby Moss.  
—*Mr. Cameron*.

A M P H I B I A .

Order ANOURA.

Family RANADÆ.

Genus RANA.

RANA TEMPORARIA. Common Frog.

Very common.

Family BUFONIDÆ.

Genus BUFO.

BUFO VULGARIS. Common Toad. Paddock.

Everywhere common.

BUFO CALAMITA. Natter-jack Toad.

Bootle. Common. One taken at Oxton Hill, by Mr. Price, 1851, and another between Egremont and New Brighton, this year. In ditches about Leasowe. At Southport, Mr. Cameron informs me, it is more common than the ordinary Toad.

THE FAUNA OF LIVERPOOL.

Order URODELA.

Family SALAMANDRADÆ.

Genus TRITON.

TRITON CRISTATUS. Common Warty Newt. Great Water Newt.  
Frequently found in the roads after rain. In ponds, ditches, and under stones.

Genus LISSOTRITON.

LISSOTRITON PUNCTATUS. Common Smooth Newt. Small Newt. Eft,  
or Evet.

In ponds and ditches; often abundant.

LISSOTRITON PALMIPES. Palmated Smooth Newt.

Three fine specimens of this rare reptile, caught by my children in a clear shallow stream at Upton, in 1851, lived for three months in a glass jar, amongst "*Vallisneria Spiralis*."

CLASS 4.—PISCES.

Order ACANTHOPTERYGII.

Family PERCIDÆ.

Genus PERCA.

PERCA FLUVIATILIS. The Perch.

In ponds and streams generally.

Genus LABRAX.

LABRAX LUPUS. The Basse. Sea Perch.

In the Dee and round the neighbouring coast.

Genus ACERINA.

ACERINA VULGARIS. The Ruffe, or Pope.

Caught in the Dee above Chester.—*Mr. Brockholes*. Streams in Lancashire which run into the Mersey.—*Mr. N. Cooke*.

Genus TRACHINUS.

TRACHINUS DRACO. Great Weever. Sting-bull.

I have seen a dried specimen hanging in a cottage at Hoylake, but it is not certain that it was taken within our district.

TRACHINUS VIPERA. Lesser Weever. Otter Pike. Sting-fish.

This fish is noted for the mischievous effects to the fishermen which follow punctures inflicted by spines which arise from their dorsal fins and opercula. In volume V. of the Proceedings of the Literary and Philosophical Society, I have endeavoured to describe a true poison apparatus which is lodged in grooves of the spines. Severe pain, often continued for three or four hours, always follows wounds, and in some instances deep seated suppuration takes place, leaving the hand or fingers permanently crippled.

Having urged upon the fishermen the practice of tying a tight ligature above the seat of punctures and sucking the wounds, which is now generally followed, the usual serious effects are less frequently seen.

## THE FAUNA OF LIVERPOOL.

### *With Hard Checks.*

#### *Genus* TRIGLA.

TRIGLA CUCULUS. The Red Gurnard. Cuckoo Gurnard.

The least frequent of the three Gurnards taken round our shores.

TRIGLA HIRUNDO. The Sapphirine Gurnard.

Very common.

TRIGLA GURKARDUS. The Grey Gurnard.

About equally common.

#### *Genus* COTTUS.

COTTUS GOBIO. River Bullhead. Miller's Thumb.

Mr. Webster has caught them in the Dee, above Chester. Probably in other fresh water streams.

COTTUS BUBALIS. Father Lasher. Long-spined Cottus.

Caught occasionally in the Dee, and at the north of Wirral.

#### *Genus* ASPIDOPHORUS.

ASPIDOPHORUS EUROPEUS. Armed Bullhead. Pogge.

Constantly to be seen amongst the shrimpers' captures.

#### *Genus* SEBASTES.

SEBASTES NORVEGICUS. The Bergylt. Norway Haddock.

One given to me in 1851. The Hoylake fishermen had not seen the species before.

#### *Genus* GASTEROSTEUS.

GASTEROSTEUS TRACHURUS. The Rough-tailed Stickleback.

Waters in the Warrington district.—*Mr. N. Cooke.* In Wallasey Pool, where the water is more than brackish. The specimens from this locality seem to be little inconvenienced by being transposed from salt to fresh water or *vice versa* several times.

GASTEROSTEUS LEIURUS. Smooth-tailed Stickleback.

In ponds, streams, and ditches.

GASTEROSTEUS PUNGITIUS. Ten-spined Stickleback.

Common in ponds and ditches.

GASTEROSTEUS SPINACHIA. Fifteen-spined Stickleback.

Pools amongst rocks at Hilbre. At Caldy Blacks, and round the shores.

### *Family* SPARIDÆ.

#### *Genus* PAGELLUS.

PAGELLUS CENTRODONTUS. Common Sea-beam.

This species, caught about our shores, is occasionally seen in the market.

### *Family* SCOMBERIDÆ.

#### *Genus* SCOMBER.

SCOMBER SCOMBER. The Mackarel.

At times in considerable numbers.

#### *Genus* ZEUS.

ZEUS FABER. The Dory, or Doree.

Not rare.

THE FAUNA OF LIVERPOOL.

*Genus* LAMPRIS.

LAMPRIS GUTTATUS. The Opah, or King-fish.

A specimen caught in the Dee in 1839, by a Hoylake fisherman. Mr. Mather informs me that another has been taken.

*Family* MUGILIDÆ.

*Genus* MUGIL.

MUGIL CAPITO. The Grey Mullet.

Caught in the Dee, at the north of Wirral, and elsewhere.

*Family* GOBIADÆ.

*Genus* MURÆNOIDES.

MURÆNOIDES GUTTATA. The Spotted Gurnell. Butter Fish.

Common in pools at low water, frequently caught in shrimp nets.

*Genus* GOBIUS.

GOBIUS NIGER. The Black Goby. Rock Goby, or Rock Fish.

I took a specimen in a pool at low ebb at Hilbre Island, 1851. Occasional, but by no means common.

GOBIUS MINUTUS. The Freckled, or Spotted Goby.

Constantly caught in shrimp nets. Plentiful in pools at the sea side.

*Genus* CALLIONYMUS.

CALLIONYMUS LYRA. The Gemmeous Dragonet.

This very beautiful fish is frequently brought in by the shrimpers of the coast.

*Pectoral Fins Feet-Like.*

*Genus* LOPHIUS.

LOPHIUS PISCATORIUS. Fishing Frog. Angler. Sea Devil.

Not uncommon. One of great size caught in the George's Dock in 1852.

A specimen of the red-throated Diver was given to me by a fisherman, who saw it swimming upon the surface of the water and suddenly disappear; immediately afterwards he hooked a "Sea Devil," and found the bird alive in his stomach.

*Family* LABRIDÆ.

*Genus* CRENILABRUS.

CRENILABRUS MELOPS. The Gilt Head. Connor. Golden Maid.

Rare. I have a specimen caught off Hoylake, 1850.

*Genus* SCIÆNA.

SCIÆNA RUPESTRIS. Jago's Goldsinny.

One caught near Hoylake this year.

*Order* MALACOPTERYGII.

(ABDOMINALES.)

*Family* CYPRINIDÆ.

CYPRINUS CARPIO. The Common Carp.

In ponds generally, and in the various streams of the district.

CYPRINUS AURATUS. The Gold Carp.

In the ponds of pleasure grounds, &c.

THE FAUNA OF LIVERPOOL.

*Genus* GOBIO.

GOBIO FLUVIATILIS. The Gudgeon.

In the Alt river.—*Mr. Parke.* In the Leeds canal.—*Mr. Brockholes.* Streams in Lancashire which join the Mersey.—*Mr. N. Cooke.*

*Genus* TINCA.

TINCA VULGARIS. The Tench.

Common in ponds. In the Alt and Weaver rivers.

*Genus* ABRAMIS.

ABRAMIS BRAMA. The Bream. The Carp Bream.

In the rivers Weaver, Dee, and Alt. Also in ponds in Lancashire.

ABRAMIS BLICCA. The White Bream, or Bream Flat.

Taken in the river Weaver.—*Mr. N. Cooke.*

*Genus* LEUCISCUS.

LEUCISCUS RUTILUS. The Roach.

The common fish of our ponds, and of most streams in Lancashire and Wirral.

LEUCISCUS VULGARIS. The Dace, Dare, or Dart.

Ponds about Whitby, Cheshire. River Dee. Rare in the Weaver. *Mr. E. Parke* kindly supplied me with specimens from the river Alt, near Sephton, where they are called "Graining;" they were sent to *Mr. Yarrell*, who at once agreed that they were Dace.

LEUCISCUS LANCASTRIENSIS. The Graining.

*Mr. Yarrell*, quoting from *Pennant* (*British Fishes*, Vol. 1st, page 406,) gives "the Mersey near Warrington, and the river Alt which runs by Sephton," as the localities for this fish. *Mr. Y.* also remarks that "several streams in Burton Wood and Sankey which flow into the Mersey near Warrington, and others in or near the township of Knowsley which also form the Alt, produce the Graining in great numbers." By the kindness of *Mr. N. Cooke*, I have been put in possession of specimens of the true Graining from the Weaver, which differ much from the Dace (locally Graining) of the Alt, both in size and general appearance, together with other peculiarities which are well laid down in *Mr. Yarrell's* work. They are abundant in the streams about Warrington, whilst the Dace are extremely scarce there. Whether the Graining exists in the streamlets which go to form the Alt or not, I have not determined, but it is unlikely that they would be in the tributaries and not in the river itself. So far as I am able to decide, the Dace is common in the Alt but not in the Weaver, and the Graining is equally abundant in the Weaver though not in the Alt.

LEUCISCUS CEPHALUS. The Chub.

Taken in the Weaver.—*Mr. N. Cooke.*

LEUCISCUS ERYTHROPHthalmus. The Red-eye. Rudd.

Pits at West Derby, from which locality *Mr. N. Cooke* has stored reservoirs in the Warrington district.

LEUCISCUS CERULEUS. The Azurine. Blue Roach.

I have had two of this species kindly supplied me by *Mr. Parke* from a pit at Croxteth: they appear to tally more with our Roach (colour excepted) than with the Rudd, which last is a deeper fish in shape, and altogether more stunted and massive.

**LEUCISCUS PHOXINUS.** The Minnow.

Although generally believed to be in the district, I have never met with any person who has caught specimens.

*Genus* COBITIS.

**COBITIS BARBATULA.** Loach, Loche, or Beardie.

Taken in the Alt river; also in the Mersey and Dee.

*Family* ESOCIDÆ.

*Genus* ESOX.

**ESOX LUCIUS.** The Pike, Pickerell, Jack, Luce.

In a large piece of water near Gayton Mill. Alt. Rivers and meres in Lancashire.

*Genus* BELONE.

**BELONE VULGARIS.** The Garfish, Sea-pike, Mackerel Guide.

On the Wirral coast and off the Magazines, about the Mackerel season.

*Family* SALMONIDÆ.

*Genus* SALMO.

**SALMO SALAR.** The Salmon.

In the Dee, Mersey, and Alt rivers.

**SALMO TRUTTA.** The Salmon Trout.

Caught very rarely in the Alt.—*Mr. Parke.* Also in the Weaver.—*Mr. Cooke.*

**SALMO FARIO.** The Common Trout.

Very rarely in the Alt. Streams which join the Mersey.

*Genus* OSMERUS.

**OSMERUS EPERLANUS.** Smelt. Sparling.

Mr. Cameron found many in the Mersey, in the channel between the Garston Docks and the east iron Church.

*Genus* THYMALLUS.

**THYMALLUS VULGARIS.** The Grayling.

Mr. Webster informs me that he has taken this species abundantly in the Dee.

*Family* CLUPEIDÆ.

*Genus* CLUPEA.

**CLUPEA HARENGUS.** The Herring.

Occasionally common.

**CLUPEA SPRATTUS.** The Sprat.

Common round the coast.

*Genus* ENGRAULIS.

**ENGRAULIS ENCRASICOLUS.** The Anchovy.

Fine specimens taken occasionally in the Dee and about the coast.

SUB-BRACHIAL MALACOPTERYGII.

*Family GADIDÆ.*

*Genus MORRHUA.*

**MORRHUA VULGARIS.** The Common Cod.

At times abundant about the Dee and north of Wirral. More rarely in the Mersey.

**MORRHUA ÆGLEFINUS.** The Haddock.

Common.

**MORRHUA LUSCA.** The Bib, Pout, or Whiting-pot.

Very frequent. The Hoylake fishermen apply the name of "Miller's Thumb" both to this species and the Pogge.

**MORRHUA MINUTA.** The Power, or Poor Cod.

Very abundant early in August this year, (1854,) as many as five or six having been seen in a single pool at ebb-tide. They have since increased greatly in numbers, poor persons gathering them in sufficient quantities for food. I have seen them also at Hilbre Island.

*Genus MERLANGUS.*

**MERLANGUS VULGARIS.** The Whiting.

Common.

**MERLANGUS POLLACHIUS.** The Pollack.

Caught, but not frequently, by the Hoylake fishermen.

*Genus MERLUCIUS.*

**MERLUCIUS VULGARIS.** The Hake.

Taken occasionally.

*Genus LOTA.*

**LOTA MOLVA.** The Ling.

About the coast. Rocks at Runcorn.—*Mr. N. Cooke.*

**LOTA VULGARIS.** The Burbot. Eelpout.

Caught in the Weaver.—*Mr. N. Cooke.*

*Genus MOTELLA.*

**MOTELLA VULGARIS.** The Three-bearded Rockling. Sea-loche. Whistle Fish.

Pretty frequently caught; seen at times in rock pools at low water. Runcorn.—*Mr. N. Cooke.*

**MOTELLA QUINQUECIRRATA.** The Five-bearded Rockling.

Taken in the Mersey near Hale.—*Mr. S. Archer.* Specimens have been given to me occasionally by the Hoylake fishermen, but they are less common than the last species.

*Family PLEURONECTIDÆ.*

*Genus PLATESSA.*

**PLATESSA VULGARIS.** The Plaice.

Very common on sandy and muddy ground.

## THE FAUNA OF LIVERPOOL.

**PLATESSA FLESUS.** The Flounder Flook.

Locally, "White Flook." Not so common: more frequent in brackish water and muddy bottoms. Mersey, Weaver, &c.

**PLATESSA LIMANDA.** Common Dab.

Pretty abundant, but not so common as Plaice. The fishermen call it "Garvin."

**RHOMBUS LEVIS CORNUBICUS.** Lemon Dab. Smooth Dab.

The least common of the flat fishes of the coast. Found in hard, rough ground. It is confined to salt water. Called locally, "Sweet Flook."

**PLATESSA LIMANDOIDES.** Long Rough Dab.

Locally, "Ganny Flook." Found in about equal numbers with the "Smooth Dab;" rare near the shore, more frequent in deep water.

### *Genus* HIPPOGLOSSUS.

**HIPPOGLOSSUS VULGARIS.** The Holibut.

The Hoylake fishermen take one or two in a year.

### *Genus* RHOMBUS.

**RHOMBUS MAXIMUS.** The Turbot. Rawn Flook.

Caught rarely near the land, but frequently at a distance from shore.

**RHOMBUS VULGARIS.** The Brill. Bret.

Not uncommon.

**RHOMBUS PUNCTATUS.** Bloch's Topknot.

Two or three given to me in 1851, but the fisherman was not sure of the locality.

**RHOMBUS MEGASTOMA.** The Whiff. The Carter.

I have had two specimens, caught between the Dee's mouth and the Lightship, in 1851 and in 1853.

**RHOMBUS ARNOGLOSSUS.** The Scaldfish. Megrim, or Smooth-sole.

Young. One caught at the mouth of the Dee, 1852.

### *Genus* SOLEA.

**SOLEA VULGARIS.** The Sole.

Very common.

**SOLEA VARIEGATA.** The Variegated Sole.

Mouth of the Dee, 1852. Specimens now and then.

## *Family* CYCLOPTERIDÆ.

### *Genus* CYCLOPTERUS.

**CYCLOPTERUS LUMPUS.** The Lump Sucker. Sea Owl, or Cock Paddle.

At Hilbre Island occasionally, and most likely all round the coast where there are patches of rock. "Caligus Mulleri" is parasitic upon it sometimes.

### *Genus* LIPARIS.

**LIPARIS VULGARIS.** The Unctuous Sucker, or Sea Snail.

Very often taken in shrimp nets, and occasionally in pools at ebb tide.



## APODAL MALACOPTERYGII.

### *Family* MURÆNIDÆ.

#### *Genus* ANGUILLA.

ANGUILLA ACUTIROSTRIS. The Sharp-nosed Eel.

Common in ponds and streams.

ANGUILLA LATIROSTRIS. The Broad-nosed Eel.

In the same situations as the last species, but less common.

#### *Genus* CONGER.

CONGER VULGARIS. The Conger.

Under ledges of rock in the Dee, Mersey, and elsewhere.

#### *Genus* LEPTOCEPHALUS

LEPTOCEPHALUS MORRISII. The Anglesey Morris.

Mr. Studley Martin described a fish which he had taken at the Dingle but did not preserve, it appeared to tally exactly with Mr. Yarrell's account of this species. On referring Mr. M. to the figure and description in "British Fishes," he at once recognised the species as that which he had found.

#### *Genus* AMMODYTES.

AMMODYTES TOBIANUS. The Sand Eel. Hornels.

Common.

AMMODYTES LANCEA. The Sand Launce. Riggle.

Common.

## LOPHOBRANCHII.

### *Family* SYGNATHIDÆ.

#### *Genus* SYGNATHUS.

SYGNATHUS ACUS. The Great Pipe-fish.

Dee and north of Wirral. Formby.—*Mr. Cameron.*

SYGNATHUS ÆQUOREUS. Æquoreal Pipe-fish.

In the Dee, but not common.

SYGNATHUS ——— ?

Before making any record of the fishes of the coast I had seen one of the smaller species, which was probably "Typhle."

## CHONDROPTERYGII.

### *Family* STURIONIDÆ.

#### *Genus* ACIPENSER.

ACIPENSER STURIO. The Common Sturgeon.

Rare captures at the north of Wirral and in the Mersey.

### *Family* SQUALIDÆ.

#### *Genus* SCYLLIUM.

SCYLLIUM CANICULA. The Small Spotted Dog-fish.

Frequently taken, to the fishermen's disappointment, upon the lines which are set for cod.

THE FAUNA OF LIVERPOOL.

*Genus GALEUS.*

**GALEUS VULGARIS.** The Common Tope.

Mostly caught in the same manner as the above.

*Genus ACANTHIAS.*

**ACANTHIAS VULGARIS.** The Picked Dog-fish.

Commonly taken upon cod lines.

*Genus SQUATINA.*

**SQUATINA ANGELUS.** The Angel-fish. Monk-fish.

One thrown ashore after a storm.—*Mr. Price.*

*Family RAIDÆ.*

*Genus TORPEDO.*

**TORPEDO NOBILIANA.** The New British Torpedo.

A specimen, which is stuffed and now in the Royal Institution Museum, was given to me in the summer of 1853, by one of the Hoylake fishermen.

*Genus RAIÆ.*

**RAIÆ BATTIS.** The Skate. Blue Skate.

This is the largest sized species, and the most esteemed for food about our coast. Very common, especially in winter, at the back of West Hoyle, and over the North Banks. Called locally "Blueit."

**RAIÆ MARGINATA.** The Bordered Ray.

Liverpool is named as a locality for this fish in "Yarrell's British Fishes," Vol. 2, p. 564. The fishermen who have seen the figure, say that they have noticed this specimen but very rarely.

**RAIÆ MIRALETUS.** The Homelyn Ray. Spotted Ray.

Not unfrequently brought in by the Hoylake men, taken about the entrance of the Dee and at the north of Wirral.

**RAIÆ CLAVATA.** The Thornback.

Very common. Last year two immense specimens of Ray, the largest being nearly eight feet long and almost as broad, were taken at Hoylake. The skin was uniformly roughened by very small spines, having stellated bases. From an examination of a portion of the skin which was sent to Mr. Yarrell, that gentleman formed the opinion that it might belong to a female of "Clavata." The fishermen, who constantly catch Maiden Ray of smaller size, are strongly of opinion as to their being distinct from any of their ordinary captures, and the outline of the fish certainly corresponded more with one of the sharp nosed species. The under surface was whitish, with numerous mucous pores surrounded by dark spots. I should have been more particular in noticing details, had the fish been sent which was promised me.

Besides the species already named, the fishermen, when they have been shewn separately Yarrell's figures, invariably have fixed upon "Oxyrynchus," which they call "Bilner Ray," and "Spinosa," as having been taken, but very rarely.

*Genus TRYGON.*

**TRYGON PASTINACA.** Sting Ray. Trygon. Fire-flaire.

One caught near Hilbre, was given to me. 1851. Taken a few times, but rare.

THE FAUNA OF LIVERPOOL.

*Family* PETROMYZIDÆ.

*Genus* PETROMYZON.

PETROMYZON MARINUS. The Lamprey.

Streams between Warrington and the Mersey.—*Mr. N. Cooke.*

PETROMYZON FLUVIATILIS. Lampern. River Lamprey.

River Dee, not common. In the Alt, scarce.—*Mr. Parks.* Mr. Brockholes saw another species in the Alt, (Planeri?) they were gregarious, twelve or fourteen together in gravelly shoals.

SUB-KINGDOM 2.—INVERTEBRATA.

CLASS MOLLUSCA.

ACEPHALA TUNICATA.

*Family* ASCIDIADÆ.

*Genus* ASCIDIA.

ASCIDIA SORDIDA.

Now and then found at Hilbre. Taken once or twice in the dredge. The fishermen bring it in rarely.

ASCIDIA ELLIPTICA.

I have met with it at Hilbre three or four times, attached to stones.

ACEPHALA LAMELLIBRANCHIATA.

*Family* PHOLADIDÆ.

*Genus* PHOLAS.

PHOLAS CRISPATA.

Abundant at Hilbre Island imbedded in the sandstone rock; also between Hilbre and Hoylake impacted in clay.

PHOLAS CANDIDA.

Common, burrowing in peat and clay, from Leasowe towards Hoylake. In clay a little north of Egremont slip. Formby shore also.

PHOLAS PAPYRACEA.

Woodside formerly. Locality now destroyed.—*Mr. Marratt.*

*Family* GASTROCHENIDÆ.

*Genus* SAXICAVA.

SAXICAVA ARCTICA.

Hilbre Island. Rare. Dredged young in the Channel between Dove and Hoyle banks. A little east of Hoylake amongst stones, mud, and sea-weed. Also upon oysters at Hoylake.

*Family* MYADÆ (the Gaper Tribe.)

*Genus* MYA.

MYA TRUNCATA.

Found plentifully at low ebb opposite Hoylake, and more sparingly along most of the coast at the north of Wirral and up the Dee. Also dredged, small, occasionally in deeper water.

**MYA ARENARIA.**

Dead valves between Crosby and Formby.—*Mr. S. Archer.*

*Family* CORBULIDÆ.

*Genus* CORBULA.

**CORBULA NUCLEUS.**

Specimens, with a thick brown epidermis, dredged from amongst sandy mud, stones, and sea-weed, in the channel between Dove and Hoyle Banks. Dead valve, off Rock Lighthouse.—*Mr. Cameron.* A large number was given to me by a fisherman, who found them amongst the mud adhering to the "foot-rope" of his net. They differed from our former captures in being scarcely, if at all, covered by epidermis. They were of various colours, some uniformly whitish or lemon yellow, and others had beautiful radiations of a dark crimson or light pink hue upon a whitish ground. They were from the "slutch" of Formby channel.

*Family* SOLENIDÆ.

*Genus* SOLEN.

**SOLEN SILIQUA.**

Formerly found alive on the North Shore about Waterloo; locality destroyed.—*Mr. Cameron.* Dead shells occasionally picked up.

**SOLEN ENSIS.**

Abundant in the dead state on the North Shore and elsewhere, the valves united by their ligaments, with the epidermis entire, and containing remnants of the animals. Occasionally, in stormy weather, thrown up alive.

**SOLEN PELLUCIDUS.**

The same remarks apply to this species, but they are very much more rarely met with. Only on the North Shore.

*Family* SOLECURTIDÆ.

*Genus* CERATISOLEN.

**CERATISOLEN LEGUMEN.**

The remarks made respecting "*Solen Ensis*" are applicable here. Rather less abundant.

*Family* TELLINIDA.

*Genus* PSAMMOBIA.

**PSAMMOBIA FERROENSIS.**

Dead valves, of good colour, and still adherent by ligament; picked up at Formby, and upon other parts of the North Shore.

*Genus* TELLINA.

**TELLINA DONACINA.**

Two young specimens, dredged off the mouth of the Dee, August, 1852.—*Mr. Webster.*

**TELLINA TENUIS.**

Dead on the shores. Dredged in the Mersey off Eastham Wood, and at New Brighton, north of the slip.—*Mr. Cameron.* Alive, in the channel between Leasowe and Hoyslake. Opposite the King's Gap, and near the Red Stones. North of Wirral, in sand and mud. Found alive also in Formby channel.

TELLINA FABULA.

Dredged in shelly sand off New Brighton.—*Mr. Cameron.* In sandy ground, north of Dove Bank, between Leasowe and Hoylake.

TELLINA SOLIDULA.

Abundant, in sand and mud, all round the coast.

*Genus* SYNDOSMYA.

SYNDOSMYA ALBA.

Dredged in shelly sand a little north of New Brighton slip. Also off Waterloo; near Formby Lightship, and close to buoy C 4.—*Mr. Cameron.* Dove Spit, in sandy ground. In sand and mud, opposite the King's Gap, Hoylake. Extremely common.

*Genus* SCROBICULARIA.

SCROBICULARIA PIPERATA.

In large numbers, imbedded in stiff blue clay, opposite the Royal Hotel, Hoylake; and, in a more scattered condition, along the Dee and Wirral shore. Between Egremont and New Brighton.

*Family* DONACIDÆ.

*Genus* DONAX.

DONAX ANATINUS.

A large bed of these shells upon the North Bank. Taken off New Brighton by *Mr. Cameron*; also north of Waterloo. It appears that these, and probably other gregarious Mollusks, after occupying one spot for a few years will remove to another, perhaps two or three miles from the original situation. The Black Duck or Scoter, as well as the different kinds of ray fish, feed upon this species. The presence of the former in large numbers becomes, therefore, a guide for the fishermen to the place where they may expect captures. Dredged in sand and shelly ground.

*Family* MACTRIDÆ.

*Genus* MACTRA.

MACTRA SOLIDA.

Along the Dee shore, and north of Wirral. This, and all the other species of Bivalve Mollusks, not sold for edible purposes, are called locally "hen-fish" by the fishermen.

MACTRA SUBTRUNCATA.

Taken, but not abundantly, opposite Hoylake and the Great Meols at low ebbs.

Dredged, very scantily, by *Mr. Cameron*, between Hoylake and the Mersey.

MACTRA STULTORUM.

North of New Brighton. Dredged in shelly sand, dead, opposite the Dingle, by *Mr. Cameron.* Dove Spit. Is found alive, buried in the sand, north of Wirral, and up the Dee pretty freely.

*Genus* LUTRARIA.

LUTRARIA ELLIPTICA.

Dead valves. Crosby shore.

THE FAUNA OF LIVERPOOL.

*Family* VENERIDÆ.

*Genus* TAPES.

TAPES DECUSSATA.

One or two valves between Leasowe and New Brighton.—*Mr. Marratt.*

TAPES PULLASTRA.

Hilbre Island, sometimes in the substance of the sandstone rock. In mud and clay nearer Hoylake. In these places they are yellowish, chalky, or stained of the clay colour. Variegated specimens sometimes at New Brighton rocks.

*Genus* VENUS.

VENUS STRIATULA.

May be taken pretty freely in the sand and in pools at low ebbs between Hoylake and Leasowe; mostly of uniform colour. Near Formby.

VENUS FASCIATA.

A dead shell dredged at the entrance of the Dee. 1852.—*Mr. Webster.*

VENUS OVATA.

Two or three dredged off the mouth of the Dee, 1852.

*Genus* ARTEMIS.

ARTEMIS EXOLETA.

Two, living, found by *Mr. Marratt* between Crosby and Formby.

ARTEMIS LINOTA.

One or two alive, in nearly the same situation as the former; both species washed up after stormy weather.—*Mr. Marratt.*

*Genus* LUCINOPSIS.

LUCINOPSIS UNDATA.

Valves united by ligament, and occasionally with portions of the animal; not unfrequent between Bootle and Formby boat-house.—*Mr. Cameron.*

*Family* CYPRINIDÆ.

*Genus* CYPRINA.

CYPRINA ISLANDICA.

Dead valves occasionally.

*Family* CARDIADÆ.

*Genus* CARDIUM.

CARDIUM ECHINATUM.

Frequent, dead, on the Formby shore: alive on the banks. Waterloo, seldom.

CARDIUM EDULE.

Upon sand-banks near Hilbre and along the Dee shore. More or less all round the neighbouring coast.

*Family* KELLIADÆ.

*Genus* MONTACUTA.

MONTACUTA FERRUGINOSA.

At Crosby and Formby, both living and dead.

THE FAUNA OF LIVERPOOL.

MONTACUTA BIDENTATA.

Two living specimens, dredged in the "swash," between Hoylake and Hilbre.

Family CYCLADIDÆ.

Genus CYCLAS.

CYCLAS RIVICOLA.

In the canal near Liverpool. Also in the Ellesmere and Chester canal.

—*Mr. Cameron.* Very abundant.

CYCLAS CORNEA.

In most ponds. They vary greatly in size and shape in different localities.

The variety described under the name of "*Cyclas Citrina*," by Captain Brown, has been found in a pit at Upton by *Mr. Webster*.

CYCLAS CALICULATA.

In ponds near Upton. In a pond at the Carr, near the Tollgate, on the Hoylake road, and many other localities, but much less general than the former species. Pits near Zoological Gardens.

Genus PISIDIUM.

PISIDIUM PUSILLUM.

Not uncommon in ditches and ponds.

PISIDIUM CINEREUM.

In a small pond upon Bidston-hill.—*Messrs. Brockholes and Warrington.*

Bootle. In a pond between Upton and Woodchurch, by the fields.

PISIDIUM PULCHELLUM.

In ponds and ditches generally.

PISIDIUM HENSLOWIANUM.

In a small pit between Upton and Saughall-Massie.—*Mr. Webster.*

Family UNIONIDÆ.

Genus ANODONTA.

ANODONTA CYGNEA.

The variety "*Cellensis*" of Brown, very common and large in pits.

Variety "*Complanata*," in a brook below Greasby, Cheshire.

Variety "*Avonensis*?" in the Ford brook between Bidston Hill and Upton.

Scarce.

Another variety, probably "*Ponderosa*," but difficult to refer, more common than any others, and found in most of the pits in Wirral. Otterspool, Aigburth, is mentioned also by Brown as a locality for this variety.

Family MYTILIDÆ.

Genus DREISSENA.

DREISSENA POLYMORPHA.

In the Ellesmere, Leeds, and Liverpool Canals.—*Mr. Cameron.*

*Genus MYTILUS.*

**MYTILUS EDULIS.**

Large at Hilbre, Caldy Blacks, and the neighbouring rocks. In the Mersey opposite Eastham, both above and below the Old Slip: from opposite the middle of Eastham Wood to near Bromborough Pool, near in shore; the *Muscles* occupying the middle part of this space are thickly studded with *Balani*; the rest free. Woodside, opposite the Docks. Close in shore near the Dingle. Opposite Bootle Land-marks and lower down, young. Near Formby light-ship.—*Mr. Cameron.* Thickly set upon the Landing-stage and mooring-chains.

*Genus MODIOLA.*

**MODIOLA MODIOLUS.**

Rare at Hilbre, more plentiful between that island and the light-ship.

*Genus CRENELLA.*

**CRENELLA MARMORATA.**

Three or four dredged, in the "swash," between Hoylake and Hilbre.

*Family ARCADÆ.*

*Genus NUCULA.*

**NUCULA NUCLEUS.**

Dredged by *Mr. Cameron* near the Formby light-ship, and close to buoy C. 4, in black "slutch." Dead valves picked up round the shores now and then.

**NUCULA NITIDA.**

Dredged at the North of Wirral, opposite Wallasey Church; ground stony with a little sand.—*Mr. Cameron.*

*Family OSTREADÆ.*

*Genus PECTEN.*

**PECTEN VARIUS.**

Dead valves now and then on the North shore.—*Mr. Marratt.*

**PECTEN MAXIMUS.**

Single valves have been found round the shores, rarely.

**PECTEN OPERCULARIS.**

Pretty abundant upon a bank near the light-ship, called by the Hoylake fishermen the "Scallop bed." Taken in the dredge in other places, very scantily.

*Genus OSTREA.*

**OSTREA EDULIS.**

Dredged sparingly at the north of the Channel, between Dove Spit and West Hoyle. Hilbre. Hoylake. Small ones washed up by the tide between Formby and Southport.

*Genus ANOMIA.*

**ANOMIA EPHIPPIMUM.**

Found upon oysters on the shore.



GASTEROPODA PROSOBRANCHIATA.

*Family* CHITONIDÆ.

*Genus* CHITON.

CHITON CINEREUS.

Adhering to smooth stones in little pools at Hilbre, Caldy Blacks, along the North of Wirral, New Brighton, and Egremont, at ebb tide.

*Family* PATELLIDÆ.

*Genus* PATELLA.

PATELLA VULGATA.

Hilbre Island, tolerably plentiful. Sparingly at Woodside slip.

*Family* DENTALIADÆ.

*Genus* DENTALIUM.

DENTALIUM ENTALIS.

Dead, upon the North Shore and elsewhere.

*Family* TROCHIDÆ.

*Genus* TROCHUS.

TROCHUS ZIZYPHINUS.

Both dead and living, brought in occasionally by the Hoylake fishermen from deep water off the Dee's mouth and North of Wirral. Dead, between Crosby and Formby.—*Mr. Cameron.*

TROCHUS UMBILICATUS.

Once found in the dead state at Hilbre.—*Mr. Marratt.*

TROCHUS CINERARIUS.

Caldy Blacks, Hilbre, and Heylake shore, sparingly. Dredged rather abundantly off the mouth of the Dee, and in deeper water at the North of Wirral; the shells often occupied by the living Mollusks, or more frequently by Soldier Crabs. New Brighton shore.

*Family* PALUDINIDÆ.

*Genus* PALUDINA.

PALUDINA LISTERI.

Moss ditches, Southport.

PALUDINA VIVIPARA.

In the canal from Ellesmere to Chester, near Mollington Bridge.—*Mr. Cameron.*

*Genus* BITHINIA.

BITHINIA TENTACULATA.

In pits all about the district, and in most of the slow running streams, generally and abundantly distributed.

*Genus* VALVATA.

VALVATA PISCINALIS.

In ponds, streams, and ditches. Common.

THE FAUNA OF LIVERPOOL.

VALVATA CRISTATA.

In deep ditches between Leasowe and the Great Meols. Ditches and ponds in the fields between Upton and Greasby.—*Mr. Webster*. Pond below Nocturnum.—*Mr. Cameron*.

Family LITTORINIDÆ.

Genus LITTORINA.

LITTORINA LITTOREA.

Abundant in rocky places.

LITTORINA RUDIS.

New Brighton rocks. Hilbre Island. Shore north of Wirral, near Leasowe Castle.

LITTORINA SAXATILIS.

New Brighton. Upon and about the Rock Lighthouse, amongst Balani and Muscles.

LITTORINA LITTORALIS.

In rocky places amongst Fuci.

Genus LACUNA.

LACUNA VINCTA.

One specimen taken in the dredge at the entrance of the Dee, 1852.—*Mr. Webster*.

LACUNA CRASSIOR.

Numerous specimens of rather small size were dredged north of the Dove Bank. They were invariably attached to "*Alcyonidium Hirsutum*." One of large size was dredged at the mouth of the Dee by *Mr. Webster*. Taken in the dredge by *Mr. Cameron*, off New Brighton.

Genus RISSOA.

RISSOA ULVÆ.

Very abundant upon the sandy flat between the Dee shore and Hilbre Island. In brackish water, of good size, in Bromborough Pool and other inlets. Everywhere along the North Shore.

RISSOA VITREA.

Has been found between Formby and Southport.—*Mr. Whitehead*.

Family TURRITELLIDÆ.

Genus TURRITELLA.

TURRITELLA COMMUNIS.

Dead, in the middle of the Mersey, opposite the Dingle.—*Mr. Cameron*. North of Wirral.

Family CERITHIADÆ.

Genus APORRHAIIS.

APORRHAIIS PES PELICANI.

A few dead specimens on the North Shore.—*Mr. Cameron*.

Family SCALARIADÆ.

Genus SCALARIA.

SCALARIA TURTONIS.

Dead shells, formerly abundant but now scarce, on the North Shore.—*Mr. Cameron*.

THE FAUNA OF LIVERPOOL.

SCALARIA COMMUNIS.

Formerly common on the North Shore, now less so.

*Family* PYRAMIDELLIDÆ.

*Genus* EULIMA.

EULIMA SUBULATA.

Picked up occasionally, dead, at Southport and along the North Shore.

EULIMA POLITA.

Dead shells occasionally between Formby and Southport.—*Mr. Marratt.*

*Family* NATICIDÆ.

*Genus* NATICA.

NATICA MONILIFERA.

Specimens have often been given to me alive and kept so for a considerable time in sea water. They were taken in trawl nets at the north of Wirral. Along the North Shore.

NATICA NITIDA.

Dead shells found, from time to time, round the neighbouring shores, and taken in the dredge. Living specimens dredged by Mr. Webster between the Dee and the Light-ship.

*Family* MURICIDÆ.

*Genus* MUREX.

MUREX ERINACEUS.

Dead shells taken in the dredge occasionally.

*Genus* PURPURA.

PURPURA LAPILLUS.

Dredged in the Mersey, opposite Eastham Wood, in shelly sand and shingle. Near Bromborough Pool, in stony ground. New Ferry, near the hulks; also on the eastern side of the river near the Dingle.—*Mr. Cameron.* Caldý Blacks. New Brighton. Mr. Brockholes met with banded and imbricated varieties upon the shore near Bromborough.

*Genus* NASSA.

NASSA RETICULATA. Dead shells in the "Swash."

Rarely on the shore.

*Genus* BUCCINUM.

BUCCINUM UNDATUM.

In the Mersey, opposite Eastham Wood, off Birkenhead and Woodside Slips, past Bootle Landmark.—*Mr. Cameron.* North of Wirral, opposite Leasowe Castle. Hilbre Island and Caldý Blacks, abundant; ground stony.

*Genus* FUSUS.

FUSUS ANTIQVUS.

Dead shells and living specimens dredged north of Dove Bank, 1851. Dead shells all along the north shore.

THE FAUNA OF LIVERPOOL.

*Family* CONIDÆ.

*Genus* MANGELIA.

**MANGELIA TURRICOLA.**

Dredged amongst seaweeds in rocky ground between the Red Noses and Dove Bank. Moderately abundant.

**MANGELIA RUFÆ.**

Equally as numerous as the last species, and in the same situations.

*Family* CYPRÆADÆ.

*Genus* CYPRÆA.

**CYPRÆA EUROPEA.**

Dead, once or twice on the north shore.

GASTEROPODA OPISTHOBANCHIATA.

*Family* BULLIDÆ.

*Genus* CYLICHNA.

**CYLICHNA CYLINDRACEA.**

Three or four dead specimens found by Mr. Marratt, near the second Bootle Landmark.

**CYLICHNA OBTUSA.**

Extremely abundant, burrowing in the sand, over the flat surface between the Dee Shore and Hilbre Islands. Small winding tracks may be seen in the sand, ending with slight elevations, immediately beneath which the animals may be found. Sometimes sparingly at Hilbre. North Shore, especially between Formby and Southport, mostly dead.

*Genus* TORNATELLA.

**TORNATELLA FASCIATA.**

Dead shells now and then upon the North Shore.—*Mr. Cameron.*

*Genus* SCAPHANDER.

**SCAPHANDER LIGNARIUS.**

Has been found very rarely, dead, upon the North Shore.

*Genus* PHILINE.

**PHILINE APERTA.**

Dead shells abundant and in good condition along the shores occasionally. Several living specimens were dredged at the north of Wirral, between Leasowe and Hoylake, in 1852; two were kept alive in sea water for three or four weeks.

*Family* DORIDIDÆ.

*Genus* DORIS.

**DORIS TUBERCLATA.**

This species has been pretty freely met with, sometimes of a lemon yellow colour, and sometimes variously mottled with brown, at Hilbre Island, Caldy Blacks, and the rocks at New Brighton.

**DORIS JOHNSTONI.**

I met with one specimen at Hilbre, 1851.

**DORIS BILAMELLATA.**

Rocks at Hilbre Island, where the large brown variety is sometimes plentiful. At New Brighton, also, occasionally. A smaller and lighter coloured variety is abundant on the dock wall at Woodside, and along the Cheshire side of the Mersey.

**DORIS DEPRESSA.**

I once met with a specimen of this small species at Hilbre Island.

**DORIS PROXIMA.**

This species was extremely common on the shore between Egremont and New Brighton in August this year. There is an account of it in the "Annals of Natural History," for August, 1854, by Messrs. Alder and Hancock. Mr. Alder, to whom specimens were sent, writes, "it was first discovered on Birkenhead shore by Mr. Price. The Doris is so like 'Aspera' that it requires a critical eye to distinguish it, but when the tongue of each is examined they are quite different." White and yellow varieties are met with. I have taken it freely at Hilbre Island also.

**DORIS PILOSA.**

At Hilbre Island, Caldys Blacks, and other rocky places round our shores. A deep purplish black variety has been met with at Hilbre, and I believe also on the Mersey shore.

**DORIS SUBQUADRATA.**

The single specimen from which the figure in Alder and Hancock's work was drawn was taken at Torquay. During a visit to Caldys Blacks, Mr. Webster and myself were fortunate enough to find a second, which was sent to Mr. Alder, by whom the species was confirmed; it was in company with "Doris Pilosa."

*Genus POLYCERA.*

**POLYCERA LESSONI.**

One dredged north of Wirral, 1852.—*I. B.*

**POLYCERA OCELLATA.**

Frequently taken at Hilbre, Egremont, and elsewhere.

*Genus ANCULA.*

**ANCULA CRISTATA.**

Taken frequently at Hilbre. Dredged north of Wirral. Estuary of the Mersey.—*Mr. Price.* Egremont shore.

*Family TRITONIDÆ.*

*Genus TRITONIA.*

**TRITONIA HOMBERGI.**

One specimen found at Hilbre by Mr. S. Archer. It has also been met with upon the western shore of the Mersey, near the entrance of the river. Its presence in these localities is rather remarkable, as it is a deep water species.

**TRITONIA PLEBEIA.**

Taken in the dredge at the north of Wirral.

Family EOLIDIDÆ.  
Genus DENDRONOTUS.

**DENDRONOTUS ARBORESCENS.**

Very common at Hilbre until 1853, when it was seldom found. Plentiful about Woodside slip, and the adjoining stony ground.—*Mr. Price*. Pale yellow, and the more ordinary brown varieties are met with. Taken at New Brighton, 1854. Specimens small.—*Mr. Price*. It is by no means so abundant as in former years.

Genus DOTO.

**DOTO CORONATA.**

Taken once at Woodside.—*Mr. Price*.

Genus EOLIS.

**EOLIS PAPILLOSA.**

Rocky places round the neighbouring shores. Hilbre, Caldy Blacks, New Brighton, &c. A small variety, not a third part of the ordinary size, and of lighter colour, taken at Hilbre, and on the Egremont shore, 1854. This was published formerly by Messrs. Alder and Hancock, under the title of "Eolis Obtusalis," "but," Mr. Alder writes, "we have given it up as a species, and have united it with 'Papillosa.'"

**EOLIS CORONATA.**

Stony ground. Hilbre and elsewhere. Some of the specimens found on the Egremont shore, which were sent to Mr. Alder, were the darkest coloured that he had seen from any locality.

**EOLIS DRUMMONDI.**

The most common species of Eolis about the neighbourhood. Always to be obtained at Hilbre.

**EOLIS LANDBURGI.**

Until 1849, when I was so fortunate as to find one of this species at Hilbre, only a single specimen had been discovered at Saltcoats. In June, 1853, I found, as I considered, another in the same locality, which tallied in every respect with the former, size excepted, being nearly double the length. It was forwarded to Mr. Alder, but did not get into his possession until it was partially decomposed. Mr. Alder writes, "From an examination of the remains and the *tongue* it might be 'E. Landburgi.'"

**EOLIS AURANTIACA.**

At Hilbre once or twice. Mr. Price has taken it at Woodside and New Brighton.

**EOLIS PICTA.**

Found at Hilbre twice or thrice. Egremont shore, 1854.

Genus EMBLETONIA.

**EMBLETONIA PALLIDA.**

Discovered by Mr. Price upon Birkenhead shore. See "Annals of Natural History," August, 1854, where it is described by Messrs. Alder and Hancock. It differs from other British species in having a double row of papillæ at the sides.

*Genus* ANTIOPA.

## ANTIOPA HYALINA.

In July, 1851, in company with Mr. Price, we each picked up a specimen of this new species at Hilbre Island. One was sent to Mr. Alder, but did not arrive in a living state. In August, this year, I found a very fine one within a few yards of the same locality, which fortunately got into Mr. Alder's possession alive. Messrs. Alder and Hancock's description of the animal, in the "Annals of Natural History," for August, 1854, runs thus, "Pellucid, yellowish, with brown markings down the middle of the back, branchiæ elliptical, tuberculated, hyaline, with the central vessel fulvous; dorsal tentacles obtuse, obscurely laminated, united by a crest; oral tentacles united by a narrow veil." The second specimen, Mr. Alder remarks, "was more mature, and in better condition than the first, and differs from it in the greater length and more pointed character of the dorsal tentacles. The papillæ are much attenuated and elongated above, with the point enlarged and obtuse. The gland is darker and a little branched. The tail is also more produced. Length,  $\frac{3}{4}$ -inch." Mr. Hancock has kindly furnished a drawing of the animal with his usual high finish and faithfulness of nature, which, it is hoped, will be engraved for the present volume.

## GASTEROPODA PULMONIFERA.

*Family* LIMACIDÆ.*Genus* ARION.

## ARION EMPIRICORUM.

Damp lanes and meadows abundant.

## ARION HORTENSES.

In gardens about Upton, and doubtless elsewhere.

*Genus* LIMAX.

## LIMAX AGRESTIS.

Very general and plentiful.

## LIMAX CINEREUS.

Not uncommon in gardens, cellars, and damp situations.

## LIMAX ARBORUM.

Numerous at Upton in 1852, upon beech trees. They have not been seen since, though tracks have been observed upon the bark of the trees.

## LIMAX FLAVUS.

In damp cellars not uncommon. Often found in publican's vaults.—*Mr. Cameron.*

*Family* HELICIDÆ.*Genus* VITRINA.

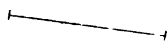
## VITRINA PELLUCIDA.

Amongst moss, under stones, and at the roots of grass, in woods and hedges. Generally distributed. More readily found in spring.

*Genus* ZONITES.

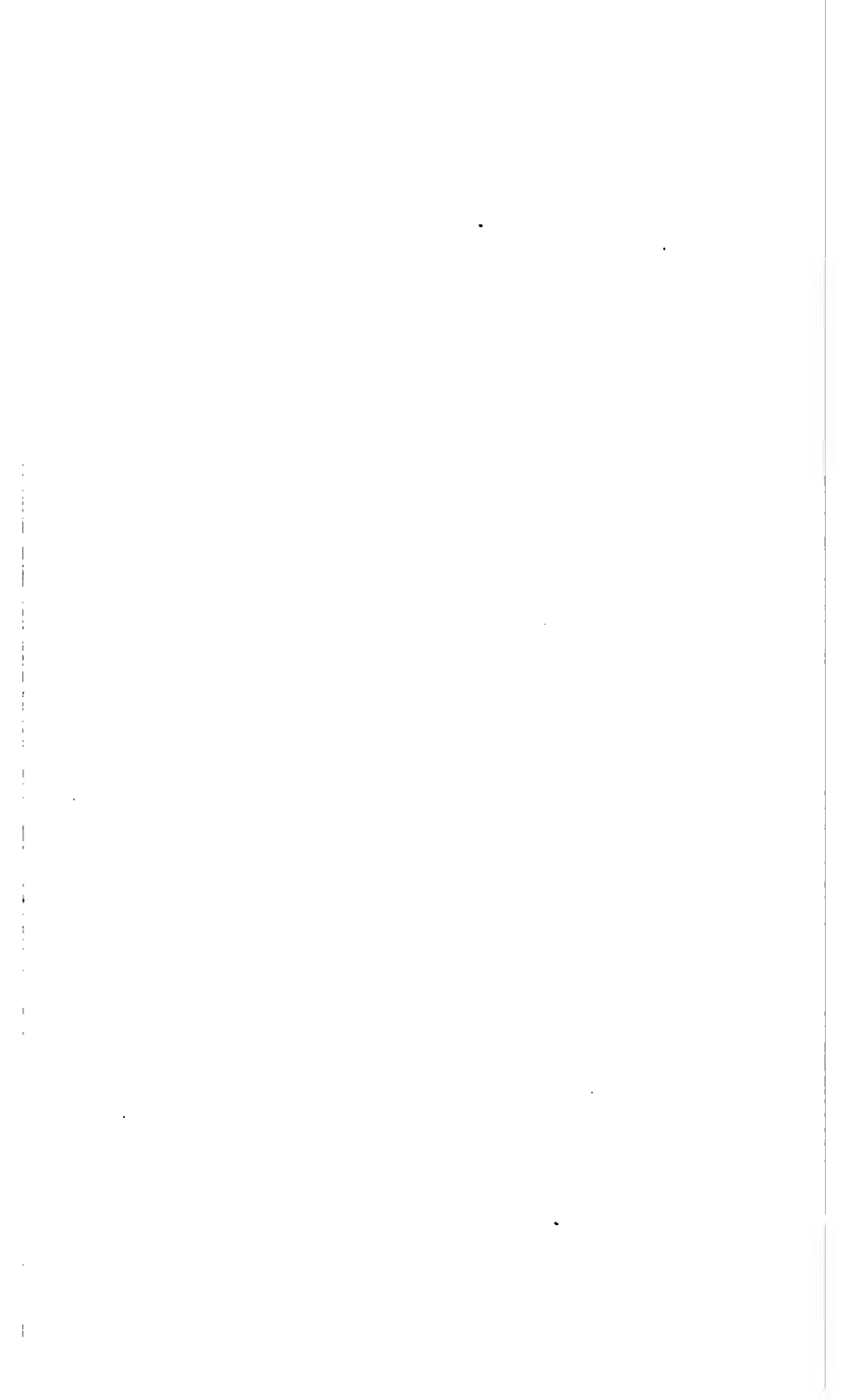
## ZONITES CELLARIUS.

Common in damp cellars, also amongst decaying wood, leaves, or other rubbish; in fields and hedges where there is moisture. General.



ANTIOPA HYALINA





## THE FAUNA OF LIVERPOOL.

### ZONITES ALLIARIUS.

Under stones, amongst moss, &c. Very common.

### ZONITES NITIDULUS.

Common amongst nettles, and in damp situations.

### ZONITES RADIATULUS.

Thinly scattered at the roots of damp grass in meadows.

### ZONITES NITIDUS.

Sparingly in a boggy ditch between Woodchurch and Noctorum.—*Mr. Webster.*

Also at Oxtun. Common on a boggy piece of water formerly a mill dam, near Huyton Collieries.—*Mr. Whitehead.*

### ZONITES EXCAVATUS.

At the foot of Bidston Park wall.—*Mr. Webster.* Tolerably common in fields and lanes about the Dingle, Aigburth, and Garston.—*Mr. Cameron.*

### ZONITES CRYSTALLINUS.

Under stones. Not uncommon.

## Genus HELIX.

### HELIX ASPERSA.

Very numerous.

### HELIX ARBUSTORUM.

Abundant in boggy places between Woodchurch and Noctorum, and along the line of meadows leading by the Ford stream, sometimes, though rarely, in the Upton Road near the Ford Bridge. Near Liscard.—*Mr. S. Archer.* Found numerously in a ditch between Upper and Lower Tranmere.

### HELIX NEMORALIS.

Common in hedge-rows. Very numerous upon the sand hills near the shore.

What is now termed a variety, "*Hortensis*," has been found in two very circumscribed localities, at Higher Tranmere by *Mr. Warrington*, and at Huyton by *Mr. Whitehead*. *Mr. Webster* endeavoured to introduce a colony of the latter in the Upton neighbourhood by placing 30 or 40 fine specimens in a hedge row; not even a vestige of them was ever seen afterwards.

### HELIX CAPERATA.

Very common at the Little Meols, between Hoylake and the Dee shore. Local but abundant on the sand hills round the coast, more rarely inland. Good specimens have been found in a lane between the Wavertree Mill and the Church.—*Mr. Cameron.*

### HELIX HISPIDA.

The variety "*Concinna*" of Turton, Brown, and others, general and common.

### HELIX SERICIA.

Near Chester.

### HELIX ACULEATA.

In damp places, amongst moss and leaves, and under stones.

### HELIX FULVA.

A few amongst dead leaves and moss; also under stones, mostly in damp situations.

**HELIX FUSCA.**

On hedge banks, crawling, when damp, upon fern and brambles, or, if dry, at the roots of grass, between Upton and Moreton. Very local. Most commonly found in autumn, and occasionally in spring.

**HELIX PULCHELLA.**

Common amongst short grass and under stones on sand hills near New Brighton, and generally, though thinly diffused.

The ribbed variety, often described as a distinct species by the name "Crenella," abundant but local, near Saughall-Massie, and found sparingly in other places. Hilbre, Hoylake, &c.

**HELIX ROTUNDATA.**

Common under stones, and amongst moss or the roots of grass all round the district. The Crystalline white variety, without coloured streaks, was found by Mr. Webster, between Upton and Saughall-Massie.

**HELIX PYGMÆA.**

Not uncommon under leaves and stones, in damp spots and hedge rows.

*Genus* BULIMUS.

**BULIMUS ACUTUS.**

Very local. In a field a little to the west of Leasowe Lighthouse, upon a sandy bank amongst short grass. Less numerous at the Little Meols.

*Genus* PUPA.

**PUPA UMBILICATA.**

Common amongst dry leaves, and at the roots of hedge rows. On old walls in dry situations.

**PUPA MUSCORUM.**

Amongst short grass on the Leasowes and the pastures adjoining.

**PUPA EDENTLUA.**

Very rare. In a hedge-row between Upton and Saughall-Massie.—*Mr. Webster.*  
River bank, New Ferry.—*Mr. Warrington.*

**PUPA PYGMÆA.**

Not uncommon under stones and broken bricks. In swampy ground near Oxton.—*Mr. Cameron.*

**PUPA SUBSTRIATA.**

Very rare. A few specimens found in the same situation as "Zonites Nitidus," near Woodchurch.—*Mr. Webster.*

**PUPA ANTIVERTIGO.**

Found rather more abundantly than the last in similar localities. Near Oxton, in a field on the way to Woodchurch; ground boggy.—*Mr. Cameron.*

*Genus* BALEA.

**BALEA FRAGILIS.**

Discovered upon willow trees, in Clifton Park, by Mr. Diggles.

*Genus* CLAUSILIA.

**CLAUSILIA NIGRICANS.**

Prenton Wood. Hedge-rows, near Rock Ferry. Bromborough. Park-gate.  
Most abundant on the clay banks of the Mersey, near New Ferry.

THE FAUNA OF LIVERPOOL.

*Genus ZUA.*

**ZUA LUBRICA.**

A common shell, found under stones, amongst damp moss and decaying leaves.

*Genus SUCCINEA.*

**SUCCINEA PUTRIS.**

Abundant along the brooks and damp ditches adjoining, crawls generally over surface leaves, more rarely immersed. The variety *Pfeifferi*, formerly a species, found upon nettles in a damp ditch near the Ford stream.

*Family LIMNÆADÆ.*

*Genus PHYSA.*

**PHYSA FONTINALIS.**

Common in ponds and ditches.

**PHYSA HYPNORUM.**

Common in ditches where there is generally a slight run of water.

*Genus PLANORBIS.*

**PLANORBIS ALBUS.**

General in ponds and ditches.

**PLANORBIS GLABER.**

Was abundant in 1850, in a ditch near Leasowe.—*Messrs. Cameron and Marratt.* The district having been flooded by the inroad of salt water during the stormy weather at the latter part of that year, when the embankment was broken through, this species has disappeared.

**PLANORBIS NAUTILEUS.**

In ponds about Upton, at the Great Meols, and in many other situations.

**PLANORBIS CARINATUS.**

Very common.

**PLANORBIS VORTEX.**

Very common everywhere.

**PLANORBIS SPIROBIS.**

Abundant where it occurs, but more local than the last. In ponds between Upton and Woodchurch.

**PLANORBIS CONTORTUS.**

In deep ditches between Leasowe and Great Meols. In ponds abundantly between Runcorn Gap and Warrington.

**PLANORBIS NITIDUS.**

Abundant. Local.

**PLANORBIS LACUSTRIS.**

Formerly in a pond near Windsor. Doubtful in a pond at Oxton along with "*Planorbis Nitidus*."

*Genus LIMNÆUS.*

**LIMNÆUS PEREGER.**

All the varieties in different ponds and ditches.

**LIMNÆUS AURICULARIUS.**

Ponds at Upton. Also at Upper Tranmere.—*Mr. Warrington.*

## THE FAUNA OF LIVERPOOL.

### LIMNÆUS STAGNALIS.

In many ponds and ditches generally distributed.

### LIMNÆUS TRUNCATULUS.

Plentiful and general in half dry ditches and water courses.

### LIMNÆUS GLABER.

In a ditch between Saughall-Massie and Greasby, by the fields. Higher Tranmere. Formerly in a ditch near St. Clement's Church, Liverpool. Truncated specimens in a pond between Eastham and Willaston.—*Messrs. Cameron and Marratt.*

### LIMNÆUS PALUSTRIS.

Not uncommon in pits and ditches.

#### *Genus* ANCYLUS.

### ANCYLUS FLUVIATILIS.

Common on smooth stones in running water.

### ANCYLUS OBLONGUS.

In many ponds adhering to dead flags and sticks. Often attached to the smooth parts of the stems of flags near the roots when pulled out of the water.

#### *Family* AURICULIDÆ.

#### *Genus* CONOVULUS.

### CONOVULUS DENTICULATUS.

Has been found pretty freely at times in Bromborough Pool. It used to be in Wallasey Pool also, before the recent alterations.

#### *Genus* CARYCHIUM.

### CARYCHIUM MINIMUM.

Common upon dead leaves, especially in shallow drains amongst shady plantations which are always damp.

## CEPHALOPODA DIBRANCHIATA.

#### *Family* OCTOPODIDÆ.

#### *Genus* ELEDONE.

### ELEDONE CIRRHOSUS.

Specimens furnished by fishermen from deep water round this coast from time to time.

#### *Family* TEUTHIDÆ.

#### *Genus* SEPIOLA.

### SEPIOLA ATLANTICA.

Very abundant. Constantly brought in by shrimp catchers.

#### *Genus* LOLIGO.

### LOLIGO MEDIA.

Not unfrequent.

#### *Family* SEPIADÆ.

#### *Genus* SEPIA.

### SEPIA OFFICINALIS.

Mouth of the Dee and elsewhere, specimens taken by the fishermen now and then. Once in the Mersey, near the George's Dock. Ova sometimes found at Hilbre and upon other rocky places.

SUB-KINGDOM 3.—ARTICULATA.

CLASS CRUSTACEA.

DECAPODA.—BRACHYURA.

*Family* LEPTOPODIADÆ.

*Genus* STENORYNCHUS.

STENORYNCHUS PHALANGIUM. Long-legged Spider Crab.

Hilbre, New Brighton, and elsewhere. Taken in the dredge in deeper water.

*Family* MAIADÆ.

*Genus* PISA.

PISA —————?

Mr. Marratt remembers having seen a species of this genus, but cannot determine which.

*Genus* HYAS.

HYAS ARANEUS.

Not unfrequent in tide pools at Hilbre and elsewhere. Taken also in the dredge.

*Family* CANCERIDE.

*Genus* CANCER.

CANCER PAGURUS. Great Crab.

Rather a plentiful species here but seldom of large size. Numerous at Hilbre. August, 1854.

*Family* PORTUNIDÆ.

*Genus* CARCINUS.

CARCINUS MENAS. Common Shore Crab. Harbour Crab.

Very common upon the shores everywhere.

*Genus* PORTUNUS.

PORTUNUS PUBER. Velvet Swimming Crab.

I have a specimen given to me by a Hoylake fisherman. Locality not certain.

PORTUNUS DEPURATOR. Cleanser Swimming Crab.

Common both in tide pools and in deeper water.

*Family* PINNOTHERIDÆ.

*Genus* PINNOTHERES.

PINNOTHERES PISUM.

Very common in Muscles and Modioli, the females from the latter are often very large.

*Family* GONOPLACIDÆ.

*Genus* GONOPLAX.

GONOPLAX ANGULATA. Angular Crab.

Specimens taken rarely in shrimp-nets.

THE FAUNA OF LIVERPOOL.

*Family* CORYSTIDÆ.

*Genus* CORYSTES.

CORYSTES CASSIVELAUNUS. Masked Crab.

Once taken on the Egremont shore by Mr. A. Higginson. Dredged at the mouth of the Dee.

DECAPODA ANOMOURA.

*Family* PAGURIDÆ.

*Genus* PAGURUS.

PAGURUS BERNHARDUS. Hermit, or Soldier Crab.

Very common. In the shells of Buccinum, Littorina and others.

*Family* PORCELLANADÆ.

*Genus* PORCELLANA.

PORCELLANA PLATYCHELES. Hairy Porcelain Crab.

Frequently found at Hilbre, and dredged in deeper water. Specimens may be met with, occasionally, in rocky pools at low water. Seems to live for a long time in captivity, even with a small quantity of sea water.

PORCELLANA LONGICORNIS. Minute Porcelain Crab.

More abundant than the latter, and found in similar situations.

*Genus* GALATHEA.

GALATHEA SQUAMIFERA. Scaly Galathea.

In rocky tide pools occasionally, but more often in deeper water. Specimens mostly small.

DECAPODA MACROURA.

*Family* ASTICIDÆ.

*Genus* HOMARUS.

HOMARUS VULGARIS. Lobster.

Many years since one of this species was caught at Hilbre, by Mr. C. Robin. Some of the oldest fishermen remember that they were formerly caught there, but very rarely, as well as many other creatures now no longer found; the ledges between the rocks being more silted up with sand and affording less harbour.

*Genus* NEPHROPS.

NEPHROPS NORVEGICUS. Norway Lobster.

Three specimens taken by a Hoylake fisherman on the west side of the Dee's mouth, four years ago.

*Family* CRANGONIDÆ.

*Genus* CRANGON.

CRANGON VULGARIS. Common Shrimp.

Abundant.

*Family* PALÆMONIDÆ.

*Genus* HIPPOLYTE.

HIPPOLYTE SPINUS. Sowerby's Hippolyte.

One of this species, which is rare, was given to me by a fisherman, August, 1854.

## THE FAUNA OF LIVERPOOL.

### HIPPOLYTE VARIANS. Varying Hippolyte.

In tide pools on the Egremont shore.

*Genus* PANDALUS.

### PANDALUS ANNULICORNIS. Æsop Shrimp.

This species, which is the plentiful edible prawn (or locally "sprawn,") of our district, has often been mistaken for the young condition of the true one.

*Genus* PALEMON.

### PALEMON SERRATUS. The Common Prawn.

By no means common. Sometimes the fishermen may bring in from twelve to twenty amongst a hamper full of the former species.

*Family* PENÆADÆ.

*Genus* PASIPHÆA.

### PASIPHÆA SIVADO.

This, which appears to be a rare British species, has been given to me by a Dee fisherman. All the Hoylake men know it, and say that they may, on an average, meet with one in a week. The specimen is in the Royal Institution Museum.

## DIVISION ENTOMOSTRACA.

### LEGION BRANCHIOPODA.

#### *Order* CLADOCERA.

#### *Family* DAPHNIADÆ.

#### *Sub-Family* DAPHNINA.

*Genus* DAPHNIA.

### DAPHNIA PULEX.

In various ponds and ditches; sometimes, when of a red colour and very numerous, giving the water quite a blood-like tinge.

### DAPHNIA VETULA.

Occasionally met with both in Wirral and Lancashire. In ponds at Litherland and Scarisbrick.—*Mr. Weightman.*

### DAPHNIA RETICULATA.

In a pond near Eastham, June, 1852.—*Mr. Weightman.*

### DAPHNIA ROTUNDA.

Ponds in Lancashire.—*Mr. Weightman.* Also in Wirral.

*Genus* BOSMINA.

### BOSMINA LONGIROSTRIS.

In the brook that divides Seaforth from Litherland.—*Mr. Weightman.*

#### *Family* LYNCEIDÆ.

*Genus* EURYCERCUS.

### EURYCERCUS LAMELLATUS.

Ponds at Spital and Bromborough. May, 1852.—*Mr. Weightman.*



## THE FAUNA OF LIVERPOOL.

### *Genus* CHYDORUS.

#### CHYDORUS SPHERICUS.

Pond near Woodchurch, June, 1852. Has bred freely in my Vallisneria jar.—  
Pond at Roby.—*Mr. Weightman*.

### *Genus* ACROPERUS.

#### ACROPERUS NANUS.

Mr. Weightman met with one specimen at Aintree bearing most resemblance to this species, but larger than it is described in Baird's work.

### *Genus* ALONA.

#### ALONA QUADRANGULARIS.

In the Litherland neighbourhood.—*Mr. Weightman*.

### *Genus* PLEUROXUS.

#### PLEUROXUS TRIGONELLUS.

Tolerably plentiful in the same pond with the last species, but none of the specimens were striated as in the figures of Baird's "British Entomostraca."

### *Genus* PERACANTHA.

#### PERACANTHA TRUNCATA.

Waterloo, October, 1851.—*Mr. Weightman*.

## LEGION LOPHYROPODA.

### *Order* OSTRACODA.

#### *Family* CYPRIDÆ.

##### *Genus* CYPRIS.

#### CYPRIS TRISTRIATA.

Frequent in ditches and ponds.

#### CYPRIS MONACHA.

Waterloo.—*Mr. Weightman*. Ponds and streams in Wirral.

#### CYPRIS FUSCA.

Ponds in Cheshire.

#### CYPRIS COMPRESSA.

Taken by Mr. Weightman. Locality forgotten.

#### CYPRIS MINUTA.

Roby, August, 1851.—*Mr. Weightman*.

#### CYPRIS ELLIPTICA.

Ponds in Lancashire.

#### CYPRIS ——— ?

Waste ground in the neighbourhood of Liverpool. October, 1851.

##### *Genus* CANDONA.

#### CANDONA REPTANS.

Found at Scarisbrick. August, 1851.—*Mr. Weightman*.

#### *Family* CYTHERIDÆ.

##### *Genus* CYTHERE.

#### CYTHERE AURANTIA.

In tide pools round the shores.

CYTHERE ——— ?

A species found by Mr. Weightman in May 1852, which he cannot refer to any described in Baird's Work.

Order COPEPODA.

Family CYCLOPIDÆ.

Genus CYCLOPS.

CYCLOPS QUADRICORNIS.

Common in most ponds and ditches; all the varieties are met with.

Genus CANTHOCAMPTUS.

CANTHOCAMPTUS MINUTUS.

Cheshire. Seaforth.—*Mr. Weightman.*

CANTHOCAMPTUS STROMII ?

New Brighton, in tide-pools, 1852.—*Mr. Weightman.*

CANTHOCAMPTUS FURCATUS.

Hilbre, and in pools amongst seaweeds round the coast.

Genus ARPACTICUS.

ARPACTICUS CHELIFER.

Not uncommon upon the shores of Wirral.

Genus ALTEUTHA.

ALTEUTHA DEPRESSA.

Found occasionally in the pools upon the shores.

Family DIAPTOMIDÆ.

Genus DIAPTOMUS.

DIAPTOMUS CASTOR.

In a pond between Eastham and Rock Ferry, May, 1852. Mr. Weightman met with specimens of a green variety at Roby, in August and September, 1851; and a male of a very large green variety from a ditch near Seaforth: it was very distinct from that caught at Roby, and much more beautiful.

LEGION PÆCILOPODA.

Order SIPHONOSTOMA.

Tribe PELTOCEPHALA.

Family CALIGIDÆ.

Genus CALIGUS.

CALIGUS RAPAX.

Parasitic upon the Sapphirine Gurnard.

CALIGUS MÜLLERI.

Attached in great numbers to a specimen of "Cyclopterus Lumpus," and upon a very large Thornback.

## THE FAUNA OF LIVERPOOL.

*Having no work of reference to the following division of the Crustacea, the twelve species below, which I have seen on the shores, are placed without arrangement.*

### ARCTURUS LONGICORNIS.

Dredged at the entrance of the Dee.

### COROPHIUM LONGICORNIS.

In tide pools.

\_\_\_\_\_ ?

Three specimens (unnamed) of a Crustacean with long antennæ, and about an inch and a-half in length, taken at Hilbre, September, 1854.

### TALITRUS LOCUSTA.

Abundant in tide pools and everywhere round the coast.

### GAMMARUS PULEX.

In fresh water streams and ponds.

\_\_\_\_\_ ?

A small, dark coloured, very active species, mostly swimming on its back, often plentiful in sea water.

### CAPRELLA PHASMA.

Very plentiful amongst sea weeds, zoophytes and sponge at Hilbre, and elsewhere.

### LIGIA OCEANICA.

Sparingly at Hilbre and Egremont.

### LIGIA \_\_\_\_\_ ?

Three specimens taken at Hilbre, August, 1854. Name not determined.

### LIMNORIA TEREBRANS.

The wooden piles of the Rock lighthouse are completely drilled by this species.

### NYMPHON GRACILE.

In most rocky pools at Hilbre, New Brighton, &c.

### PYCNOGONUM LITTORALE.

Is often abundant amongst seaweed and zoophytes, where there are patches of rock.

## DIVISION CIRRIPIEDIA.

### Family LEPADIDÆ.—PEDUNCULATED CIRRIPEDES.

Genus LEPAS.

#### LEPAS ANATIFERA.

Genus CONCHODERMA.

#### CONCHODERMA AURITA.

#### CONCHODERMA VIRGATA.

The three foregoing species seen on ships' bottoms in the Graving Docks occasionally. Always of foreign origin.

## SESSILE CIRRIPEDES.

### Family BALANIDÆ.

Genus BALANUS.

#### BALANUS SCOTICUS.

Mostly attached to Modioli.

## THE FAUNA OF LIVERPOOL.

### BALANUS RUGOSUS.

Very abundant, attached to seaweed, shells, sea walls, &c. Thickly set upon the Rock Lighthouse.

### BALANUS CLAVATUS.

Not so common. In the clefts of the wooden piles about piers, &c.

### BALANUS COMMUNIS.

Upon Buccinum and other shells.—*Mr. Marratt.*

### BALANUS BALANOIDES.

Attached to smooth stones, pieces of slate, &c., upon the shores.

## CLASS INSECTA.

### Order LEPIDOPTERA.

#### RHOPALOCERA.

##### *Genus PIERIS.*

#### PIERIS BRASSICÆ.

Very common.

#### PIERIS RAPE.

Plentiful.

#### PIERIS NAPI.

Very common. Mr. Almond found a *Crysalis* upon the stem of a snow-drop, early in February.

##### *Genus ANTHOCARIS.*

#### ANTHOCARIS CARDAMINES.

Female much less common than the male: she may frequently be mistaken for one of the smaller whites.

##### *Genus COLIAS.*

#### COLIAS EDUSA.

One taken at Upton.—*Mr. Webster.* Has been found at New Brighton. South Lancashire, occasionally. As this insect is exceedingly rare, and generally found where clover grows, it is probably imported in forma ovi, amongst clover seeds. Seldom on the following year in the same locality.

##### *Genus THECLA.*

#### THECLA RUBI.

Jackson's Wood, Claughton; rare. One specimen only reported to have been taken.

##### *Genus CHRYSOPHANUS.*

#### CHRYSOPHANUS PHLEAS.

Very general.

##### *Genus POLYOMMATUS.*

#### POLYOMMATUS ÆGON.

Has been found in Jackson's Wood, but principally upon the northern part of Bidston Hill, where it is plentiful.

THE FAUNA OF LIVERPOOL.

POLYOMMATUS ALEXIS.

Very common everywhere.

*Genus ARGYNNIS.*

ARGYNNIS AGLAJA.

Stated to have been taken upon the sand-hills at New Brighton.

ARGYNNIS SELENE.

Said to have been found at Eastham.

*Genus MELITÆA.*

MELITÆA ARTEMIS.

Fields at Eastham.—*Mr. Samuel Archer.* In the district between Crosby and Lydiate.

*Genus VANESSA.*

VANESSA CARDUI.

Plentiful during some seasons, and scarce at others.

VANESSA ATALANTA.

Occasionally plentiful.

VANESSA IO.

Very general; much more common some seasons than others.

VANESSA URTICÆ.

Very common.

VANESSA POLYCHLOROS.

In Brunswick-road, Liverpool, a few years ago.—*Mr. Benjamin Cooke.*

VANESSA C. ALBUM.

One specimen taken at Tranmere.—*Mr. Diggles.*

*Genus SATYRUS.*

SATYRUS SEMELE.

Local, but plentiful at New Brighton and Bidston Heath. Waterloo and Crosby, common.

SATYRUS JANIRA.

Common in grass fields.

SATYRUS TITHONUS.

Abundant.

SATYRUS MEGÆRA.

Very common.

SATYRUS ÆGERIA.

Not common. Occasionally found in woody places.

SATYRUS DAVUS.

Has been taken in a damp moor at Simon's Wood.

SATYRUS PAMPHILUS.

Common everywhere.

*Genus STEROPES.*

STEROPES PANISCUS.

Said to have been found beyond New Ferry.

THE FAUNA OF LIVERPOOL.

*Genus* PAMPHILA.

PAMPHILA LINEA.

Eastham. Near Bidston. Very rare.

PAMPHILA SYLVANUS.

Rock Ferry.—*Mr. S. Archer.*

*Genus* THANAOS.

THANAOS TAGES.

Rock Ferry. Prenton Wood.—*Mr. Almond.*

HETEROCERA.

SPHINGES.

*Genus* TROCHILIUM.

TROCHILIUM TIPULIFORMIS.

Taken at West Derby.—*Mr. N. Cooke.*

*Genus* ÆGERIA.

ÆGERIA BEMBICIFORMIS.

Common where poplars abound.

*Genus* SESIA.

SEZIA FUCIFORMIS.

Has been taken at New Brighton. Rare.

*Genus* MACROGLOSSA.

MACROGLOSSA STELLATARUM.

Occasional specimens found upon sand hills, principally where the "yellow bed straw" grows.

*Genus* CHÆROCAMPA.

CHÆROCAMPA PORCELLUS.

Plentiful, especially in the larva state at New Brighton. More rarely inland.

CHÆROCAMPA ELPENOR.

About Bidston. Larvæ in moderate plenty, and where "Epilobium Hirsutum" grows abundantly.

*Genus* DEILEPHILA.

DEILEPHILA EUPHORBIE.

One taken at Formby in the larva state.

DEILEPHILA GALII.

In the neighbourhood of Liverpool.—*Mr. N. Cooke.*

DEILEPHILA LINEATA.

Near Liverpool.—*Mr. N. Cooke.*

*Genus* SPHINX.

SPHINX CONVULVULI.

Rare: occasional specimens found in various localities.

THE FAUNA OF LIVERPOOL.

*Genus* ACHERONTIA.

ACHERONTIA ATROPOS.

Not uncommon in the larva state, but difficult to rear. In potato fields.

*Genus* SMERINTHUS.

SMERINTHUS OCELLATUS.

Common upon willows, as a larva; seldom taken in the perfect state.

SMERINTHUS POPULI.

Common both in the larva and imago condition.

*Genus* ANTHROCERA.

ANTHROCERA FILIPENDULÆ.

Common everywhere.

ANTHROCERA LONICERÆ.

New Brighton.—*Mr. N. Cooke.*

ANTHROCERA TRIFOLII.

Said to be taken at Hale; in some plenty. Bidston Marsh.—*Mr. N. Cooke.*

BOMBYCES.

*Genus* EUCHELIA.

EUCHELIA JACOBÆÆ.

Common on the New Brighton and Crosby sand-hills.

*Genus* LITHOSIA.

LITHOSIA COMPLANA.

One specimen taken at Tranmere by Mr. Diggles.

LITHOSIA COMPLANULA.

Taken at Bromborough and Eastham.

LITHOSIA MESOMELLA.

Rixton Moss.—*Mr. N. Cooke.*

*Genus* NUDARIA.

NUDARIA MUNDANA.

Tranmere. In hedges where "*Linaria Communis*" abounds, but not frequent.

*Genus* EUTHEMONIA.

EUTHEMONIA PLANTAGINIS.

A single specimen captured at Oxton.

*Genus* ARCTIA.

ARCTIA VILICA.

Two larvæ, believed by Mr. Diggles to be of this species, were captured at Landican a few years ago.

ARCTIA CAJA.

Very common.

*Genus* PHRAGMATOBIA.

PHRAGMATOBIA FULIGINOSA.

Generally distributed; larvæ plentiful; perfect insect seldom taken.

THE FAUNA OF LIVERPOOL.

PHRAGMATOBIA LUBRICEPEDA.

Very frequent.

PHRAGMATOBIA MENTHRASTI.

Everywhere.

PHRAGMATOBIA MENDICA.

One specimen taken at Tranmere.—*Mr. Diggles.*

Genus LIPARIS.

LIPARIS SALICIS.

Plentiful at Bidston, about willows. New Brighton.—*Mr. Brockholes.*

LIPARIS AURIFLUA.

Everywhere; about hedges.—*Mr. N. Cooke.*

LIPARIS CHRYSORRHŒA.

Everywhere.

Genus ORYGIA.

ORYGIA PUDIBUNDA.

Very general.

ORYGIA FASCELINA.

New Brighton. Moreton.—*Mr. Brockholes.* Crosby; very common. They have been found abundantly as larvæ, but seldom as perfect insects.

ORYGIA ANTIQUA.

Very general, and abundant.

Genus CLYSIOCAMPA.

CLYSIOCAMPA NEUSTRIA.

Between Moreton and Upton. Larvæ.

Genus ERIOGASTER.

ERIOGASTER LANESTRIS.

Upton and elsewhere; generally distributed. Larvæ.

Genus PŒCILOCAMPA.

PŒCILOCAMPA POPULI.

Bidston, Claughton. Principally taken at light; female very rare.

Genus LASIOCAMPA.

LASIOCAMPA RUBI.

Plentiful as larvæ everywhere; insect occasionally taken flying.

LASIOCAMPA QUERCUS.

Similar to the former.

LASIOCAMPA ROBORIS.

Considered to be a variety of Quercus, and found under similar circumstances.

LASIOCAMPA TRIFOLII.

New Brighton. Plentiful as larvæ.

Genus ODONESTIS.

ODONESTIS POTATORII.

Very common.



THE FAUNA OF LIVERPOOL.

*Genus SATURNIA.*

SATURNIA CARPINI.

Generally distributed, especially upon heathy places.

*Genus COSSUS.*

COSSUS LIGNIPERDA.

Larvæ abundant, but very difficult to rear. Perfect insect consequently scarce.

*Genus HEPIALUS.*

HEPIALUS HUMULI.

Very common.

HEPIALUS VELLEDA.

Eastham.—*Mr. Diggles.* Bromborough.—*Mr. Warrington.*

HEPIALUS SYLVINUS.

Common.

HEPIALUS LUPULINUS.

Very general.

HEPIALUS HECTUS.

Bromborough, plentiful.

*Genus CILIX.*

CILIX SPINULA.

Generally distributed.

*Genus PLATYPTERYX.*

PLATYPTERYX FALCULA.

Rixton Moss.—*Mr. N. Cooke.*

*Genus CERURA.*

CERURA FURCULA.

On this side of Warrington.—*Mr. N. Cooke.*

CERURA BIFIDA.

Tranmere, Prenton, New Brighton, Birkenhead, and elsewhere.

CERURA VINULA.

Common upon poplars and willows.

*Genus PETASIA.*

PETASIA CASSINEA.

On this side of Warrington.—*Mr. N. Cooke.*

*Genus NOTODONTA.*

NOTODONTA CAMELINA.

Tranmere, Rock Ferry, and Bidston. Two or three specimens found in a season.

NOTODONTA DICTÆA.

Not uncommon in the Birkenhead district. Wallasey.—*Mr. Brockholes.*

NOTODONTA DICTÆOIDES.

Bidston. Rare as larvæ upon birches. Two perfect insects taken by Mr. Almond.

NOTODONTA DROMEDARIUS.

One specimen captured in Jackson's Wood, Claughton.—*Mr. Diggles.* Bidston Plantation.

THE FAUNA OF LIVERPOOL.

NOTODONTA ZICZAC.

Taken at light, and occasionally bred from larvæ.

NOTODONTA CHAONIA.

Eastham Wood.—*Mr. N. Cooke.*

*Genus* DILOBA.

DILOBA CÆRULEOCEPHALA.

Tranmere, taken at lamps. Not common. At Bidston Lighthouse several have been taken by Messrs. Almond and Brockholes.

*Genus* PYGÆRA.

PYGÆRA BUCEPHALA.

Very plentiful in the larva, but less so in the perfect state.

NOCTUÆ.

*Genus* SEMAPHORA.

SEMAPHORA PSI.

Very frequent.

SEMAPHORA TRIDENS.

Near Warrington.—*Mr. N. Cooke.*

*Genus* APATELA.

APATELA LEPORINA.

Oxton. Two larvæ captured by Mr. Diggles, one was bred.

*Genus* ACRONYCTA.

ACRONYCTA ALNI.

On this side Warrington.—*Mr. N. Cooke.*

ACRONYCTA MENTANTHIDIS.

On the mosses.—*Mr. N. Cooke.*

ACRONYCTA MEGACEPHALA.

Not unfrequent.

ACRONYCTA RUMICIS.

Common.

ACRONYCTA SALICIS.

On this side Warrington.—*Mr. N. Cooke.*

*Genus* DIPHTHERA.

DIPHTHERA ORION.

Eastham. Two specimens.

*Genus* CEROPACHA.

CEROPACHA RIDENS.

Dunham Park.—*Mr. N. Cooke.*

CEROPACHA FLAVICORNIS.

Bidston.

CEROPACHA DILUTA.

Tranmere. One specimen.—*Mr. Diggles.*

THE FAUNA OF LIVERPOOL.

CEROPACHA DUPLARIS.

Prenton, Rock Ferry. Not common.

Genus BRYOPHILA.

BRYOPHILA PERLA.

Common on mossy walls.

Genus CARADRINA.

CARADRINA MORPHEUS.

Generally distributed, but far from common. Plentiful at New Brighton.—  
*Mr. Brockholes.*

CARADRINA CUBICULARIS.

Very plentiful.

CARADRINA BLANDA.

Not unfrequent on Ragwort flowers. At New Brighton, and probably along the coast. Captured at syrup also.

Genus GRAMMESIA.

GRAMMESIA TRILINEA.

Taken plentifully at sugar.

Genus LEUCANIA.

LEUCANIA LITHARGYRIA.

Taken occasionally attracted by syrup, also flying over heath.

LEUCANIA CONIGERA.

A single specimen at Rock Ferry.—*Mr. Almond.*

LEUCANIA PUDORINA.

Reputed to be taken on Bidston Marsh.

LEUCANIA COMMA.

Taken at syrup, at Rock Ferry, Bidston, and New Brighton. Pretty plentiful.

LEUCANIA LITTORALIS.

Confined to sand hills. May be bred freely from larvæ, but the perfect insects are hidden in the melgrass. May be taken at night when flying.

LEUCANIA IMPURA.

Exceedingly common.

LEUCANIA PALLENS.

Equally common with the former.

LEUCANIA CRASSICORNIS.

Occurs freely upon the flowers of "*Arundo Phragmitis.*"

Genus NONAGRIA.

NONAGRIA FULVA.

Taken occasionally about ponds. Not scarce.

NONAGRIA TYPHÆ.

Common amongst bulrushes.

Genus GORTYNA.

GORTYNA FLAVAGO.

In some seasons it is taken plentifully at light.

THE FAUNA OF LIVERPOOL.

*Genus HYDRÆCIA.*

**HYDRÆCIA MICACEA.**

Taken under the same circumstances as the former, perhaps more plentifully.

**HYDRÆCIA NICTITANS.**

Cloughton, one specimen.—*Mr. Brockholes.*

*Genus MIANA.*

**MIANA LITEROSA.**

Tolerably plentiful upon Ragwort flowers at New Brighton, Bidston Marsh, and elsewhere.

**MIANA FURUNCULA.**

Plentiful upon the New Brighton sand hills. Bidston Marsh.

**MIANA FASCIUNCULA.**

Common, subject to great variation of colour.

**MIANA STRIGILIS.**

This, like the former, is a common and very variable insect.

**MIANA ARCUOSA.**

Bidston Marsh. Rather rare.

*Genus APAMEA.*

**APAMEA DIDYMA.**

Very plentiful.

**APAMEA UNANIMIS.**

Rare. New Brighton, Tranmere, and Bidston Marsh.

**APAMEA GEMINA.**

Pretty general.

*Genus LUPERNIA.*

**LUPERNIA CESPITIS.**

Rare. New Brighton.—*Mr. Almond.*

**LUPERNIA TESTACEA.**

Very common.

**LUPERNIA BASILINEA.**

Very general.

**LUPERNIA INFESTA.**

Scarce. New Brighton. A few specimens taken in 1853 and 1854, by Messrs. Brockholes, Warrington, and Almond.

**LUPERNIA ABJECTA.**

One specimen at New Brighton.—*Mr. Almond.* Two taken in Jackson's Wood at syrup.—*Messrs. Almond and Warrington.*

**LUPERNIA ALBICOLON.**

Common on the New Brighton sand hills.

*Genus CRYMODES.*

**CRYMODES TEMPLI.**

One specimen taken by *Mr. Brockholes* at the Bidston Lighthouse.

THE FAUNA OF LIVERPOOL.

*Genus* XYLOPHASIA.

XYLOPHASIA RUREA.

Very plentiful everywhere.

XYLOPHASIA LITHOXYLEA.

Not uncommon.

XYLOPHASIA POLYODON.

In great profusion.

*Genus* TRIPHÆNA.

TRIPHÆNA PRONUBA.

Equally abundant with the former.

TRIPHÆNA ORBONA.

Plentiful and general.

TRIPHÆNA FIMBRIA.

New Brighton. Claughton. Not very frequent.

TRIPHÆNA JANTHINA.

Pretty general, but not abundant.

TRIPHÆNA INTERJECTA.

Tranmere. New Brighton. Rather rare.

*Genus* CERIGO.

CERIGO CYTHEREA.

Rock Ferry. Claughton. Bidston Marsh. Occurring plentifully, but seldom taken in perfection.

*Genus* SEGETIA.

SEGETIA XANTHOGRAPHA.

Excessively common.

*Genus* RUSINA.

RUSINA TENEBROSA.

One specimen taken flying at Bidston. Two at New Brighton at syrup.—  
*Mr. Brockholes.* 1854.

*Genus* NOCTUA.

NOCTUA UMBROSA.

Very plentiful at Bidston, and generally distributed. At Ragwort flowers.

NOCTUA BELLA.

A common insect, found under the same circumstances as the former.

NOCTUA BAJA.

Not common in the neighbourhood. Several specimens reared from larvæ taken at Tranmere by Messrs. Brockholes and Almond. Common at New Brighton in 1858.

NOCTUA FESTIVA.

Common, especially in heathy places.

NOCTUA BRUNNEA.

Dacre Park, Rock Ferry. Not a common insect.

NOCTUA C. NIGRUM.

In various localities, but not abundant. Principally taken at lamps. Freely at syrup, in June, 1854, at New Brighton.—*Mr. Brockholes.*

THE FAUNA OF LIVERPOOL.

*Genus* CHERSOTIS.

CHERSOTIS PLECTA.

Very abundant, especially about brambles.

CHERSOTIS PORPHYRÆA.

Jackson's Wood, Claughton. Common on heath.

CHERSOTIS HAWORTHII.

Mosses on this side Warrington.—*Mr. N. Cooke.*

CHERSOTIS AGATHINA.

In the same situations.—*Mr. N. Cooke.*

*Genus* SPÆLOTIS.

SPÆLOTIS AUGUR.

Common.

SPÆLOTIS PRÆCOX.

New Brighton sand hills. Somewhat rare.

*Genus* AGROTIS.

AGROTIS SAUCIA.

Bidston. Jackson's Wood. Very rare.

AGROTIS SUFFUSA.

Very plentiful in some seasons.

AGROTIS SEGETUM.

Common at all times.

AGROTIS CORTICEA.

Oxon. Rare. New Brighton.—*Mr. Brockholes.*

AGROTIS EXCLAMATIONIS.

General and abundant.

AGROTIS FUMOSA.

New Brighton. Bred from larvæ by *Mr. Diggles.*

AGROTIS TRITICI.

Very common. New Brighton sand hills.

AGROTIS AQUELINA.

Has been captured very rarely at New Brighton.

AGROTIS CURSORIA.

Found in company with "Tritici" and the following on the New Brighton sand hills in plenty.

AGROTIS VALLIGERA.

Common on Ragwort flowers. New Brighton.

AGROTIS CINEREA.

New Brighton.—*Mr. N. Cooke.*

AGROTIS PUTA.

New Brighton.—*Mr. N. Cooke.*

AGROTIS PUTRIS.

Generally distributed. Common.

THE FAUNA OF LIVERPOOL.

*Genus CERAPTERYX.*

CERAPTERYX GRAMINIS?

New Brighton.

*Genus HELIOPHOBUS.*

HELIOPHOBUS POPULARIS.

Taken for the first time in some plenty, at light (1852) in Clifton Park.

*Genus TRACHEA.*

TRACHEA PINIPERDA.

Storeton. Jackson's Wood. Upon Scotch Fir not uncommon. Also at Bidston.

*Genus TÆNIOCAMPA.*

TÆNIOCAMPA GOTHICA.

Very general on Sallow blossoms.

TÆNIOCAMPA RUBRICOSA.

Taken pretty freely upon Sallow blossoms.

TÆNIOCAMPA OPIMA.

Rare. Several specimens taken this spring by Mr. Almond. At Bidston and Leasowe in 1854.—*Mr. Brockholes.*

TÆNIOCAMPA INSTABILIS.

Very common at light.

TÆNIOCAMPA STABILIS.

Very plentiful upon Sallow blossoms.

TÆNIOCAMPA MUNDA.

Rare. One specimen taken for the first time at Eastham Wood by Mr. Almond.

TÆNIOCAMPA GRACILIS.

Rare. In the same situations. A few specimens in various localities.

TÆNIOCAMPA CRUDA.

Bidston.—*Mr. Almond.* On sallows, Eastham Wood.

*Genus ORTHOSIA.*

ORTHOSIA YPSILON.

Bidston. Rare. Eighteen specimens taken at New Brighton by Mr. Brockholes in 1853.

ORTHOSIA LOTA.

Not common. Pretty generally distributed.

ORTHOSIA MACILENTA.

Bidston.—*Mr. Almond.* Rock Ferry.—*Mr. Brockholes.* Very rare.

*Genus ANTHOCELIS.*

ANTHOCELIS LUNOSA.

Common some seasons.

ANTHOCELIS LITURA.

Tolerably abundant everywhere.

ANTHOCELIS PISTACINA.

In some seasons extremely plentiful.

THE FAUNA OF LIVERPOOL.

*Genus* SCOLIOPTERYX.

SCOLIOPTERYX LIBATRIX.

Not common, but generally distributed in Wirral.

*Genus* TETHEA.

TETHEA RETUSA.

Upton.—*Mr. Webster.*

TETHEA SUBTUSA.

General amongst Poplars, but not plentiful.

*Genus* EUPERIA.

EUPERIA TAPETZINA.

Jackson's Wood and Claughton. Not common.

*Genus* XANTHIA.

XANTHIA FERRUGINEA.

Very abundant.

XANTHIA RUFINA.

Bidston Plantation. Not common.—*Mr. Almond.*

XANTHIA SILAGO.

Tolerably frequent upon Reed flowers at Bidston.

XANTHIA CERAGO.

Occurs even more plentifully than the last upon Ragwort flowers.

XANTHIA CITRAGO.

Oxton. Rock Ferry. Rather scarce.

*Genus* GLÆA.

GLÆA SPADICEA.

Common everywhere.

GLÆA VACCINII.

Frequent in Bidston Plantation, also at Eastham Wood.—*Mr. Brockholes.*

*Genus* SCOPELOSOMA.

SCOPELOSOMA SATELLITIA.

Bidston, Eastham Wood, and elsewhere plentiful.

*Genus* MISELIA.

MISELIA OXYACANTHÆ.

In some seasons very plentiful.

*Genus* CHARIPTERA.

CHARIPTERA APRILINA.

Bidston, Rock Ferry, and elsewhere tolerably frequent.

*Genus* DIANTHÆCIA.

DIANTHÆCIA CONSPERSA.

On this side of Warrington.—*Mr. N. Cooke.*

DIANTHÆCIA CAPSINCOLA.

Not common. Specimens found at Tranmere.

DIANTHÆCIA CUCUBALI.

On this side Warrington.—*Mr. N. Cooke.*



## THE FAUNA OF LIVERPOOL.

### *Genus* POLIA.

#### POLIA CHI.

Some seasons plentiful upon walls and trunks of trees.

### *Genus* EPUNDA.

#### EPUNDA LICHENEA.

New Brighton. Particularly upon dead thorn hedges at night by the aid of a lantern. Larvæ feed almost exclusively upon a species of "Sedum." One may be found occasionally at a Fox-glove root.

### *Genus* HADENA.

#### HADENA LUTULENTA.

Rock Ferry.—*Mr. Almond*. Claughton.—*Mr. Diggles*. A very rare insect.

#### HADENA PERSICARIE.

On this side of Warrington.—*Mr. N. Cooke*.

#### HADENA BRASSICÆ.

Very general.

#### HADENA ADUSTA.

Tranmere. Rare. One specimen taken by *Mr. Diggles*.

#### HADENA SUASA.

Taken in the neighbourhood of Bidston, but not plentifully.—*Mr. Diggles*.

#### HADENA OLERACEA.

One of our common insects.

#### HADENA PISI.

Seldom taken in the perfect state. Plentiful as larvæ from which they are easily reared.

#### HADENA THALASSINA.

Generally distributed, and moderately plentiful.

#### HADENA DENTINA.

Common.

#### HADENA GLAUCA.

Mosses about Warrington.—*Mr. N. Cooke*.

#### HADENA PROTEA.

Commonly taken at sugar.

### *Genus* APLECTA.

#### APLECTA NEBULOSA.

Plentiful at Bromborough. One specimen found at Claughton.

#### APLECTA OCCULTA.

One specimen of this rare and beautiful moth taken by *Mr. Brockholes* at Claughton.

### *Genus* PHLOGOPHORA.

#### PHLOGOPHORA METICULOSA.

Very common.

*Genus* EUPLEXIA.

EUPLEXIA LUCIPARA.

Moderately plentiful, and generally distributed.

*Genus* THYATIRA.

THYATIRA BATIS.

Has been found at Eastham, where it is probably plentiful.

THYATIRA DERASA.

Taken abundantly in various localities.

*Genus* CALOCAMPA.

CALOCAMPA VETUSTA.

One or two specimens taken in the neighbourhood of Bidston by Mr. Almond and Mr. Brockholes.

CALOCAMPA EXOLETA.

Abundant.

*Genus* CUCULLIA.

CUCULLIA CHAMOMILLE.

At Penketh, and on this side of Warrington.—*Mr. N. Cooke.*

CUCULLIA UMBRATICA.

Generally found sitting upon old palings of similar colour to themselves. Not uncommon.

*Genus* XYLOCAMPA.

XYLOCAMPA LITHORIZA.

Common upon trunks of trees and palings.

*Genus* HELIOTHIS.

HELIOTHIS MARGINATA.

New Brighton. Very rare.—*Messrs. Cooke and Almond.* Three specimens in 1854.—*Mr. Brockholes.*

*Genus* ANARTA.

ANARTA MYRTILLI.

Bidston Heath. Common.

*Genus* HELIODES.

HELIODES HEIJACA.

Not uncommon flying in the sunshine.

*Genus* PLUSIA.

PLUSIA GAMMA.

Very abundant.

PLUSIA IOTA.

Pretty general.

PLUSIA INSCRIPTA.

Equally plentiful with the former.

PLUSIA FESTUCE.

Taken in pits, on Reeds. Not uncommon.

PLUSIA CHRYSITIS.

Common where Nettles abound.

THE FAUNA OF LIVERPOOL.

*Genus* ABROSTOLA.

ABROSTOLA URTICÆ.

Near Liverpool.—*Mr. N. Cooke.*

ABROSTOLA TRIPLASIA.

Tranmere. Rare. One specimen taken by Mr. Brockholes. New Brighton.

*Genus* NÆNIA.

NÆNIA TYPICA.

Common.

*Genus* MANIA.

MANIA MAURA.

Tranmere, Claughton, and elsewhere common.

*Genus* PHILOPYRA.

PHILOPYRA TRAGOPOGONIS.

Common.

*Genus* CATOCALA.

CATOCALA FRAXINI.

Very uncommon. Two specimens taken at Bidston.

*Genus* EUCLIDIA.

EUCLIDIA MI.

Mosses on this side Warrington.—*Mr. N. Cooke*

EUCLIDIA GLYPHICA.

Near Neston.—*Mr. Almond.*

*Genus* PHYTOMETRA.

PHYTOMETRA ÆNEA.

Mosses near Warrington.—*Mr. N. Cooke.*

PYRALES.

*Genus* PYRAUSTA.

PYRAUSTA CINGULALIS.

New Brighton sand hills. Plentiful.

PYRAUSTA PURPURALIS.

Tranmere. One specimen taken by Mr. Diggles. Several taken upon New Brighton sand hills, where probably there are two or three broods in a season. 1852.

PYRAUSTA OSTRINALIS.

New Brighton. Abundant.

PYRAUSTA PUNICEALIS.

New Brighton.

PYRAUSTA CESPITALIS.

Common.

*Genus* RHODARIA.

RHODARIA SANGUINALIS.

Not uncommon at New Brighton, to which locality the insect seems to be peculiar.

THE FAUNA OF LIVERPOOL.

*Genus PYRALIS.*

**PYRALIS FARINALIS.**

Common where corn is stored.

*Genus AGLOSSA.*

**AGLOSSA PINGUINALIS.**

Common about stables and outhouses.

*Genus HYDROCAMPA.*

**HYDROCAMPA LEMNALIS.**

Common in pits.

**HYDROCAMPA STRATIOTALIS.**

Not very common. On Bidston Marsh and at New Brighton.—*Mr. Brockholes.*

**HYDROCAMPA NYMPHÆALIS.**

Common in the same localities as the last.

**HYDROCAMPA POTOMOGALIS.**

Equally abundant in the same situations.

*Genus EBULEA.*

**EBULEA SAMBUCALIS.**

Common about hedges where Elder abounds.

*Genus SCOPULA.*

**SCOPULA PRUNALIS.**

Abundant.

**SCOPULA OLIVALIS.**

Very general.

**SCOPULA ETIALIS.**

Common like the former about hedges.

**SCOPULA FERRUGALIS.**

Mosses and gardens near Warrington.—*Mr. N. Cooke.*

*Genus PIONEA.*

**PIONEA FORFICALIS.**

Plentiful.

*Genus SPILODES.*

**SPILODES STICTICALIS.**

New Brighton.—*Mr. N. Cooke.*

*Genus BOTYS.*

**BOTYS FUSCALIS.**

Rock Ferry. One specimen.—*Mr. Diggles.* One at New Brighton, in June, 1854.—*Mr. Brockholes.*

**BOTYS URTICALIS.**

Common amongst nettles.

*Genus STENOPTERYX.*

**STENOPTERYX HYBRIDALIS.**

Found abundantly in damp situations.

THE FAUNA OF LIVERPOOL.

*Genus* POLYPOGON.

POLYPOGON GRISEALIS.

Various places, but not frequent. Near woods.

*Genus* HYPENA.

HYPENA PROBOSCIDALIS.

Common.

*Genus* HYPENODES.

HYPENODES ALBISTRIGALIS.

Near Seacombe.—*Mr. N. Cooke.*

HYPENODES COSTÆSTRIGALIS.

Bidston and Jackson's Wood rarely, but plentifully in Storeton Wood.

HYPENODES HUMIDALIS.

Though Delamere forest is slightly beyond the limits of our district, I introduce this new species, which was found there, in a wet boggy place, upon the authority of *Mr. N. Cooke*, the discoverer of the insect.

*Genus* NOLA.

NOLA CUCULLALIS.

Tranmere.—*Mr. Diggles.* New Brighton.—*Mr. Warrington.*

GEOMETRÆ.

*Genus* GEOMETRA.

GEOMETRA PAPILIONARIA.

Bidston and other places in Cheshire, but rare.

*Genus* HEMITHEA.

HEMITHEA CYTHISARIA.

Common in Jackson's Wood, also in Storeton Wood.

*Genus* CHLOROCHROMA.

CHLOROCHROMA ÆRUGINARIA.

Common in hedges.

CHLOROCHROMA ÆSTIVARIA.

Not so common as the former.

*Genus* METROCAMPA.

METROCAMPA MARGARITARIA.

Pretty generally distributed.

*Genus* ELLOPIA.

ELLOPIA FASCIARIA.

Storeton Wood, where it is moderately plentiful; less so in Jackson's Wood, Claughton.

*Genus* OURAPTERYX.

OURAPTERYX SAMBUCARIA.

Common everywhere.

*Genus* RUMIA.

RUMIA CRATÆGARIA.

Very common.

THE FAUNA OF LIVERPOOL.

*Genus* EURYMENE.

EURYMENE DOLOBRARIA.

Rock Ferry. Two specimens taken by Mr. Brockholes.

*Genus* EPIONE.

EPIONE APICIARA.

Not uncommon.

EPIONE PARALELLARIA.

New Brighton. A specimen captured by the late Mr. Robson.

*Genus* ENNOMOS.

ENNOMOS ILLUNARIA.

Common.

ENNOMOS EROSARIA.

Met with in several places, but not common.

ENNOMOS TILJARIA.

Common in Clifton Park. Taken principally at light.

*Genus* ODONTOPERA.

ODONTOPERA BIDENTARIA.

Common.

*Genus* CROCALLIS.

CROCALLIS ELINGUARIA.

Not so common as the former.

*Genus* HIMERA.

HIMERA PENNARIA.

Clifton Park. Rare. Four or five specimens have been seen or taken by Mr. Diggles and Mr. Almond.

*Genus* MÆSIA.

MÆSIA FAVILLACEARIA.

Bidston Heath, where it should be abundant.—*Mr. Diggles.*

*Genus* MACARIA.

MACARIA LITURARIA.

Jackson's Wood and Storeton Wood, but by no means plentiful.

*Genus* HALIA.

HALIA WAVARIA.

Common.

*Genus* NUMERIA.

NUMERIA PULVERARIA.

Various places, but uncommon.

*Genus* FIDONIA.

FIDONIA ATOMARIA.

Bidston Heath.

FIDONIA PLUMARIA.

On mosses, near Warrington.—*Mr. N. Cooke.*

FIDONIA PINIARIA.

Storeton Wood.—*Mr. Brockholes.*

THE FAUNA OF LIVERPOOL.

*Genus* ANISOPTERYX.

ANISOPTERYX *ÆSCULARIA*.

Common. Taken on thorn twigs with a lantern at night.

*Genus* HIBERNIA.

HIBERNIA *LEUCOPHÆRIA*.

Eastham, where it is not uncommon.

HIBERNIA *RUPICAPRARIA*.

Common. Taken as "*Anisopterix Æscularia*."

HIBERNIA *PROGEMMARIA*.

Very abundant.

HIBERNIA *AURANTIARIA*.

Oxton. Rare. A specimen bred from a larva captured there by Mr. Edmondson.

HIBERNIA *DEFOLIARIA*.

Upton.—*Mr. Webster*. One specimen, a female.

*Genus* PHIGALIA.

PHIGALIA *PILOSARIA*.

Two specimens taken in Clifton Park.—*Mr. Diggles*. Reported to have been taken in Jackson's Wood, Claughton.

*Genus* NYSSIA.

NYSSIA *HISPIDARIA*.

Dunham Park.—*Mr. N. Cooke*.

NYSSIA *ZONARIA*.

New Brighton, where it is very common, and where it was first discovered. A straggler found at Bidston by Mr. Webster.

*Genus* BISTON.

BISTON *PRODROMARIA*.

Knowsley. Dunham, on oaks.—*Mr. N. Cooke*.

BISTON *BETULARIA*.

Tranmere.

*Genus* BOARMIA.

BOARMIA *REPANDARIA*.

Very abundant.

BOARMIA *ROBORARIA*.

Dunham, on oaks.—*Mr. N. Cooke*.

BOARMIA *RHOMBOIDARIA*.

Common.

*Genus* HEMEROPHILA.

HEMEROPHILA *ABRUPTARIA*.

Rock Ferry and Tranmere, a few specimens only.

*Genus* CLEORA.

CLEORA *LICHENARIA*.

Prenton Wood. Plentiful in the larvæ state.

THE FAUNA OF LIVERPOOL.

*Genus GNOPHOS.*

GNOPHOS PULLARIA.

Not uncommon. Principally in Prenton-lane and Tranmere, Cheshire.

*Genus PHASIANE.*

PHASIANE PALUMBARIA.

Common in Jackson's and Storeton Woods, Cheshire.

*Genus LOZOGRAMMA.*

LOZOGRAMMA PETRARIA.

Prenton.—*Mr. Warrington.* Somewhat rare.

LOZOGRAMMA LINEOLARIA.

New Brighton. Local but plentiful.

*Genus ANAITIS.*

ANAITIS IMBUTARIA.

On the mosses, about Warrington.—*Mr. N. Cooke.*

*Genus EUBOLIA.*

EUBOLIA CERVINARIA.

Clifton Park. Taken at light, but not commonly.

EUBOLIA MENSURARIA.

Very general.

EUBOLIA MULTISTRIGARIA.

Not uncommon. More particularly at New Brighton.

*Genus COREMIA.*

COREMIA DIDYMARIA.

Plentiful and general.

COREMIA UNIDENTARIA.

Common everywhere.

COREMIA PECTINITARIA.

Not so common as the last.

COREMIA MONTANARIA.

Very plentiful everywhere.

COREMIA FLUCTUARIA.

Equally abundant.

COREMIA PROPUGNARIA.

Less common.

*Genus THERA.*

THERA FIRMARIA.

Jackson's Wood, near Birkenhead. Not common. Also Storeton Wood, plentifully.—*Mr. Warrington.*

THERA SIMULARIA.

Jackson's Wood, near Birkenhead. Very common in firwoods.



*Genus* ANTICLEA.

ANTICLEA DERIVARIA.

Generally distributed, but not common anywhere.

ANTICLEA BADIARIA.

Plentiful and general.

*Genus* STEGANOLOPHIA.

STEGANOLOPHIA RIBESIARIA.

Found at Hale.

*Genus* HARPALYCE.

HARPALYCE SUFFUMARIA.

Common in most places.

HARPALYCE OCELLARIA.

Far from plentiful, but widely distributed.

HARPALYCE GALIARIA.

Common at New Brighton; rarely taken elsewhere.

HARPALYCE FULVARIA.

Common.

HARPALYCE CHENOPODIARIA.

By no means plentiful, but has been found in various places.

HARPALYCE MARMORARIA.

Rather rare.

HARPALYCE PYRALIARIA.

Two specimens taken in Clifton Park, Birkenhead, by Mr. Diggles, 1851.

HARPALYCE POPULARIA.

Nowhere common.

HARPALYCE ACHATINARIA.

Abundant.

HARPALYCE RUSSARIA.

Very general.

HARPALYCE IMMANARIA.

Very plentiful.

*Genus* YPSIPETES.

YPSIPETES ELUTARIA.

Exceedingly common.

YPSIPETES IMPLUVIARIA.

Pretty generally distributed, but not in great numbers.

*Genus* PHÆSYLE.

PHÆSYLE CÆSIARIA.

Rock Ferry.—*Mr. Diggles.*

PHÆSYLE MIARIA.

Cloughton. Rare.

*Genus* CHEIMATOBIA.

CHEIMATOBIA DILUTARIA.

Common about oaks. Rather difficult to capture.

THE FAUNA OF LIVERPOOL.

CHEIMATOBIA BOREARIA.

Bidston. Rare.

CHEIMATOBIA BRUMARIA.

Common.

*Genus* TRIPHOSA.

TRIPHOSA DUBITARIA.

By no means uncommon.

*Genus* PHIBALAPTERYX.

PHIBALAPTERYX LIGNARIA.

Cloughton. Very rare. One specimen taken by Mr. Diggles upon a lamp.

*Genus* CAMPTOGRAMMA.

CAMPTOGRAMMA BILINEARIA.

Common in every hedge.

*Genus* MELANIPPE.

MELANIPPE ALCHEMILIARIA.

Common.

MELANIPPE AMNICULARIA.

Not uncommon in various localities.

*Genus* EMMELESIA.

EMMELESIA RIVULARIA.

Common.

EMMELESIA HYDRARIA.

Scarce. Walker's-lane, Tranmere.

EMMELESIA DECOLORARIA.

Abundant.

EMMELESIA ALBULARIA.

Found commonly in damp situations.

EMMELESIA BIFASCIARIA.

Tranmere. Rare. One specimen taken by Mr. Almond, and several by Mr. Diggles, in Walker's-lane, Tranmere.

*Genus* ZERENE.

ZERENE RUBIGINARIA.

Tranmere. Rare. A single specimen taken three or four years ago by Mr. Diggles.

*Genus* ABRAXAS.

ABRAXAS GROSSULARIA.

Very common indeed.

ABRAXAS ULMARIA.

Eastham. Not common. Also at Rock Ferry.

*Genus* CABERA.

CABERA PUSARIA.

A very common insect.

THE FAUNA OF LIVERPOOL.

CABERA EXANTHEMARIA.

As abundant as the former.

*Genus* EPHYRA.

EPHYRA PUNCTARIA.

Rare ; one specimen taken by Mr. Warrington, at Rock Ferry.

*Genus* EUPITHECIA.

EUPITHECIA LINARIA.

Several specimens of this beautiful insect taken at Bidston, by Messrs.  
Almond, Warrington, and Brockholes.

EUPITHECIA PULCHELLARIA.

Generally distributed, but far from common.

EUPITHECIA RECTANGULARIA.

Occasionally met with.

EUPITHECIA MINUTARIA.

Common.

EUPITHECIA ELONGARIA.

Not uncommon.

EUPITHECIA NANARIA.

Found now and then.

EUPITHECIA EXIGUARIA.

This species is taken plentifully in the district.

EUPITHECIA ABBREVIARIA.

Plentiful.

EUPITHECIA INNOTARIA.

Hedges about Warrington, and elsewhere.—*Mr. N. Cooke.*

EUPITHECIA LANCEOLARIA.

Common.

EUPITHECIA CASTIGARIA.

In the mosses of the district, and in other places plentiful.

EUPITHECIA AUSTERARIA.

Abundant.

EUPITHECIA CALLUNARIA.

Common.

EUPITHECIA CENTAUREA.

Several specimens taken in a season.

EUPITHECIA SUCCENTURARIA.

Taken rather plentifully at New Brighton:

EUPITHECIA SUBFULVARIA.

Not uncommon on Ragwort flowers.—*Mr. N. Cooke.*

EUPITHECIA SUBNOTARIA.

Rare ; three specimens only have been taken, at Tranmere.

EUPITHECIA PUMILARIA.

Found upon fir trees.—*Mr. N. Cooke.*

EUPITHECIA RUFIFASCIARIA.

Common in Fir wood.

THE FAUNA OF LIVERPOOL.

**EUPITHECIA PALUSTRARIA.**

Rare. One specimen taken by Mr. Diggles at Claughton.

*Genus DOSITHEA.*

**DOSITHEA VIRGULARIA.**

Common.

**DOSITHEA SCUTULARIA.**

Rather scarce. Specimens have been taken from time to time at Wallasey, Tranmere, and elsewhere.

**DOSITHEA REVERSARIA.**

Very common.

*Genus ACIDALIA.*

**ACIDALIA PEROCHRARIA.**

Taken at Bidston.—*Mr. N. Cooke.*

**ACIDALIA LUTEARIA.**

Caught in woods.—*Mr. N. Cooke.*

**ACIDALIA NITIDARIA.**

Caught about the mosses of the district.—*Mr. N. Cooke.*

**ACIDALIA SUBSERICEARIA.**

Rare. Dacre Park, Rock Ferry.—*Mr. Diggles.* Jackson's Wood, Claughton. Bidston plantation.—*Mr. Warrington.*

**ACIDALIA REMUTARIA.**

Common.

**ACIDALIA AVERSARIA.**

Taken in 1852 in some plenty at Prenton Wood. More rarely at Rock Ferry. Near Warrington, about hedges. *Mr. N. Cooke.*

*Genus PÆCILOPHASIA.*

**PÆCILOPHASIA, MARGINARIA.**

Plentiful everywhere.

*Genus TIMANDRA.*

**TIMANDRA IMITARIA.**

Generally distributed. Common.

*Genus BRADYEPETES.*

**BRADYEPETES AMATARIA.**

Rare. Oxtou. A single specimen taken a few years ago.—*Mr. Wilson.*

*Genus STRENIA.*

**STRENIA CLATHRARIA.**

One specimen taken at Claughton by Mr. Almond.

*Genus HYRIA.*

**HYRIA AURORARIA.**

Mosses of the district.—*Mr. N. Cooke.*

**TORTRICES.**

*Genus HALIAS.*

**HALIAS PRASINANA.**

Though a common insect throughout the country, only one specimen has been taken hitherto in this neighbourhood, by Mr. Diggles.

THE FAUNA OF LIVERPOOL.

*Genus* TORTRIX.

TORTRIX PYRASTRANA.

Common.

TORTRIX XYLOSTEANA.

Not common. Taken at Upton by Mr. Webster.

TORTRIX SORBIANA.

Gardens about Warrington.—*Mr. N. Cooke.*

TORTRIX ROSANA.

Common.

TORTRIX HEPARANA.

Common.

TORTRIX RIBEANA.

Common.

TORTRIX CORYLANA.

Far from common. Generally distributed.

TORTRIX UNIFASCIANA.

Common.

TORTRIX SPECTRANA.

Uncommon. Prenton.

TORTRIX VIBURNANA.

Taken principally in the larva state, feeding upon "*Centaurea Nigra*." Very seldom taken flying.

TORTRIX ICTERANA.

Mosses in the district.—*Mr. N. Cooke.*

TORTRIX VIRIDANA.

Very common. Near oaks.

TORTRIX MINISTRANA.

Not uncommon in hedges.

TORTRIX ADJUNCTANA.

Pretty general in similar situations to the former.

*Genus* DICHELIA.

DICHELIA GROTIANA.

About the mosses.—*Mr. N. Cooke.*

*Genus* AMPHYSA.

AMPHYSA GERNINGANA.

Taken in some plenty in 1852, in Jackson's Wood, Claughton.

*Genus* LEPTOGRAMMA.

LEPTOGRAMMA LITERANA.

Very rare. Specimens have been found generally one at a time, at Bromborough, Oxtou, and Eastham.

*Genus* PERONEA.

PERONEA FAVILLACEANA.

Common in Dacre Park, Rock Ferry.—*Messrs. Diggles and Warrington.*

## THE FAUNA OF LIVERPOOL.

### PERONEA MIXTANA.

Common amongst heath, at Bidston, Storeton, Heswell, and elsewhere; requires active search to capture.

### PERONEA SCHALLERIANA.

One specimen found in Clifton Park by Mr. Diggles, in 1850.

### PERONEA COMPARANA.

Very common.

### PERONEA CALEDONIANA.

Mosses.—*Mr. N. Cooke.*

### PERONEA ABILDGAARDANA.

Equally common.

### PERONEA PERMUTANA.

Local. Sometimes more plentiful than others at New Brighton.

### PERONEA HASTIANA.

A few specimens only have been taken at Rock Ferry.—*Mr. Diggles.* Tranmere.

### PERONEA FERRUGANA.

Rare. New Brighton.

### PERONEA TRISTANA.

About Sallows near Warrington.—*Mr. N. Cooke.*

### PERONEA ASPERSANA.

New Brighton.—*Mr. N. Cooke.* Taken there plentifully, 1853.—*Mr. Warrington.*

#### Genus TERAS.

### TERAS EFFRACTANA.

Common. Claughton, Rock Ferry, and elsewhere.

### TERAS CAUDANA.

Somewhat rare. New Park, Claughton.—*Mr. Diggles.* In a small plantation at Bidston.—*Mr. Warrington.*

#### Genus DICTYOPTERYX.

### DICTYOPTERYX CONTAMINANA.

A very common insect.

### DICTYOPTERYX LEFLINGIANA.

Not uncommon about oaks.

### DICTYOPTERYX HOLMIANA.

Has been found plentifully in Tranmere.

### DICTYOPTERYX BERGMANNIANA.

Abundant amongst wild roses. New Brighton sand hills and elsewhere.

### DICTYOPTERYX FORSKALEANA.

New Brighton, but far from common.

#### Genus ARGYROTOZA.

### ARGYROTOZA CONWAYANA.

Common. Dacre Park, Bidston, &c.

#### Genus PTYCHOLOMA.

### PTYCHOLOMA LECHEANA.

Scarce. Prenton. One specimen.—*Mr. Warrington.* Three or four in various parts of Wirral.—*Mr. Diggles.*

THE FAUNA OF LIVERPOOL.

Genus DITULA.

DITULA SEMIPASCIANA.

Found on the mosses.—*Mr. N. Cooke.*

Genus PENTHINA.

PENTHINA PICANA.

Prenton. Rare.—*Mr. Warrington.*

PENTHINA PRUNIANA.

Common.

PENTHINA CYNOSBANA.

Abundant.

PENTHINA OCHROMELANA.

Not so plentiful as the former.

Genus SPILONOTA.

SPILONOTA OCELLANA.

By no means scarce. Birkenhead. Dacre Park. Probably general.

SPILONOTA ACERIANA.

Common at New Brighton.

SPILONOTA NEGLECTANA.

Common everywhere.

SPILONOTA AMENANA.

New Brighton. Rather scarce. In 1858 plentiful and general.—*Mr. Warrington.*

SPILONOTA SUFFUSANA.

Common and general.

SPILONOTA ROSÆCOLANA.

Rare. Tranmere sparingly.—*Mr. Diggle.*

SPILONOTA ROBORANA.

Common in hedges.

Genus PARDIA.

PARDIA TRIPUNCTANA.

Very abundant everywhere.

Genus NATOCELIA.

NATOCELIA UDMANNIANA.

Common about brambles.

Genus SIDERIA.

SIDERIA ACHATANA.

On the Mosses, and in gardens.—*Mr. N. Cooke.*

Genus SERICORIS.

SERICORIS CESPITANA.

New Brighton.—*Mr. N. Cooke.*

SERICORIS LACUNANA.

Common.

SERICORIS URTICANA.

Very common about nettles.

THE FAUNA OF LIVERPOOL.

*Genus* MIXODIA.

MIXODIA SCHULZIANA.

About the mosses.—*Mr. N. Cooke.*

*Genus* ORTHOTÆNIA.

ORTHOTÆNIA ANTIQUANA.

Two specimens taken at Cloughton by *Mr. Diggles.*

ORTHOTÆNIA TRIFOLIATA.

One at Cloughton.—*Mr. Diggles.*

ORTHOTÆNIA STRIANA.

A few specimens taken on Bidston Marsh by Messrs. Brockholes and Warrington.

*Genus* CNEPHASIA.

CNEPHASIA LEPIDANA.

Upon firs on the mosses.—*Mr. N. Cooke.*

CNEPHASIA MUSCULANA.

Common and general.

*Genus* SCIAPHILA.

SCIAPHILA SUBJECTANA.

Very common everywhere.

SCIAPHILA HYBRIDANA.

Common.

*Genus* SPHALEROPTERA.

SPHALEROPTERA ICTERICANA.

Not plentiful, but general.

*Genus* CLEPSIS.

CLEPSIS RUSTICANA.

On the mosses of the district.—*Mr. N. Cooke.*

*Genus* BACTRA.

BACTRA LANCEOLANA.

Common about ponds.

*Genus* PHOXOPTERYX.

PHOXOPTERYX UNGUICANA.

On the mosses.—*Mr. N. Cooke.*

PHOXOPTERYX UNCANA.

Also on moors.—*Mr. N. Cooke.*

PHOXOPTERYX COMPTANA.

On moors or mosses.—*Mr. N. Cooke.*

PHOXOPTERYX BIARCUANA.

Rare. A few specimens taken occasionally in various places, particularly Dacre Park.

PHOXOPTERYX LUNDANA.

Very common.



THE FAUNA OF LIVERPOOL.

PHOXOPTERYX MITTERBACHERIANA.

Common everywhere.—*Mr. N. Cooke.*

Genus GRAPHOLITA.

GRAPHOLITA PAYKULLIANA.

One specimen caught at Bidston by *Mr. Warrington.*

GRAPHOLITA NISANA.

Taken at Clifton Park in some plenty.

GRAPHOLITA NIGROMACULANA.

Plentiful.

GRAPHOLITA CAMPOLILIANA.

Abundant.

GRAPHOLITA TRIMACULANA.

Common.

GRAPHOLITA PENKLERIANA.

Not uncommon.

GRAPHOLITA NEVANA.

Taken occasionally in Clifton Park.

Genus PHLEODES.

PHLEODES FRUTETANA.

Pretty plentiful in hedges.

PHLEODES IMMUNDANA.

Common.—*Mr. N. Cooke.*

Genus HYPERMECIA.

HYPERMECIA ANGUSTANA.

Taken in the neighbourhood of Birkenhead.

Genus BATODES.

BATODES ANGUSTIORANA.

Not common. Found where yew trees grow.

Genus PÆDISCA.

PÆDISCA BILUNANA.

Rare. Caught in Dacre Park.

PÆDISCA CORTICANA.

Taken off fir trees at Claughton.

PÆDISCA OPHTHALMICANA.

Not uncommon some seasons. Dacre Park, Tranmere, &c.

PÆDISCA OCCULTANA.

Not plentiful. Has been caught in Jackson's Wood, Claughton.

PÆDISCA SOLANDRIANA.

Common in Dacre Park.

PÆDISCA SORDIDANA.

Clifton Park.—*Mr. Diggles.* Tranmere.—*Mr. Warrington.*

Genus EPHIPPIPHORA.

EPHIPPIPHORA SCUTULANA.

By no means scarce, especially in Prenton Wood and Dacre Park.

THE FAUNA OF LIVERPOOL.

EPHIPPIPHORA DISSIMILANA.

A specimen taken by Mr. Diggles in Oxton Road, 1850.

EPHIPPIPHORA BRUNNICHIANA.

Plentiful and general.

EPHIPPIPHORA FENEANA.

Said to be taken at Bidston.

EPHIPPIPHORA TRIGEMINANA.

Common.

*Genus* OLINDA.

OLINDA ULMANA.

Taken in woods.—*Mr. N. Cooke.*

*Genus* COCCYX.

COCCYX STROBILANA.

A specimen found by Mr. Diggles in Wirral, but the exact locality is not remembered.

COCCYX SPLENDIDULANA.

Hedges about Warrington.—*Mr. N. Cooke.*

*Genus* RETINIA.

RETINIA PINICOLANA.

This and the following insects are found in firwoods.

RETINIA BUOLIANA.

Upon firs on the mosses.—*Mr. N. Cooke.*

RETINIA PINIVORANA.

About firs in Claughton.

*Genus* STIGMONOTA.

STIGMONOTA CONIFERANA.

Rare. Has been taken occasionally in Jackson's Wood, Claughton.

STIGMONOTA FLORICOLANA?

A few of this insect (doubtfully named) were taken near Poulton, probably a new species. A few are in Mr. Warrington's collection.

STIGMONOTA TRAUNIANA?

Doubtful at present.

STIGMONOTA GERMARANA.

It has been taken abundantly in Prenton-lane, Tranmere, and Higher Bebington.—*Messrs. Diggles and Warrington.*

*Genus* DICRORAMPHA.

DICRORAMPHA PETIVERANA.

Scarce. Upton road.—*Mr. Diggles.* Tranmere.—*Mr. Warrington.*

DICRORAMPHA SATURNANA.

Rare. One specimen taken by Mr. Diggles. Locality forgotten.

DICRORAMPHA PLUMBAGANA.

Rare. Taken at Tranmere.—*Mr. Warrington.*

THE FAUNA OF LIVERPOOL.

DICRORAMPHA ARTEMISIANA.

Not uncommon about heath and gorse.

*Genus PYRODES.*

PYRODES RHEEDIANA.

Rare. Several specimens taken in 1852.

*Genus CATOPTRIA.*

CATOPTRIA ULICTEANA.

Exceedingly plentiful amongst gorse.

CATOPTRIA NIMBANA.

Taken upon oaks at Penketh.—*Mr. N. Cooke.*

CATOPTRIA HYPERICANA.

Found amongst gorse, but not very common. Jackson's Wood.

CATOPTRIA HOHENWARTHIANA.

Abundant in fields, generally distributed.

*Genus TRYCHERIS.*

TRYCHERIS MEDIANA.

Upon flowers near Warrington.—*Mr. N. Cooke.*

*Genus SIMAETHIS.*

SIMAETHIS FABRICIANA.

Common where nettles abound.

*Genus EUPÆCILIA.*

EUPÆCILIA DUBITANA.

Doubtfully named. Not uncommonly taken by beating hedges.

EUPÆCILIA MACULOSANA.

Rather scarce. Hedges in fields near Flaybrick hill. At Tranmere also.

EUPÆCILIA ANGUSTANA.

Common in Jackson's Wood.

EUPÆCILIA UDANA.

Local. Wallasey Pool in some plenty. In a brook near the copper works.

EUPÆCILIA HUMIDANA.

Rare.

EUPÆCILIA ROSEANA.

Rare. Bred from larvæ found in Teazle heads, by Mr. Brockholes.

*Genus XANTHOSETIA.*

XANTHOSETIA ZÆGANA.

Rather common.

XANTHOSETIA HAMANA.

Common.

*Genus COCHYLIS.*

COCHYLIS SMEATHMANNIANA.

Marshy ground. Penketh.—*Mr. N. Cooke.*

COCHYLIS STRAMINEANA.

Not uncommon, generally distributed.

THE FAUNA OF LIVERPOOL.

*Genus* APHELIA.

APHELIA PRATANA.

Common on Bidston Marsh.

*Genus* TORTRICOIDES.

TORTRICOIDES HYEMANA.

Plentiful in Prenton and Eastham Woods.

TINEIDÆ.

*Genus* CHILO.

CHILO PHRAGMATELLUS.

Rare. Bidston Marsh.

CHILO FORFICELLUS.

Rare. Bidston Marsh.

*Genus* CRAMBUS.

CRAMBUS HAMELLUS.

New Brighton. Rare.

CRAMBUS DUMETELLUS.

Common at New Brighton.

CRAMBUS PRATELLUS.

Very common everywhere.

CRAMBUS PASCUELLUS.

Common.

CRAMBUS HORTUELLUS.

Common.

CRAMBUS LATISTRIUS.

Formerly by no means rare at one spot in Jackson's Wood. Only three were taken 1853, as the locality is partly destroyed.

CRAMBUS CULMELLUS.

Plentiful.

CRAMBUS GENICULEUS.

Common at New Brighton.

CRAMBUS TRISTELLUS.

Common.

CRAMBUS PERLELLUS.

Plentiful on Bidston Marsh.

*Genus* EUDOREA.

EUDOREA AMBIGUALIS.

Common.

EUDOREA PYRALELLA?

Common.

EUDOREA FREQUENTELLA.

Common.

EUDOREA DELUNELLA.

Plentiful about fir trees.

THE FAUNA OF LIVERPOOL.

EUDOREA MURANA.

Rare. In Mr. Brockholes' cabinet. Taken in the district.

EUDOREA COARCTATA.

Rare in the neighbourhood. Is in Mr. Brockholes' cabinet.

EUDOREA PALLIDA.

Not common.

*Genus* ACHROEA.

ACHROEA GRISELLA.

Uncommon.

*Genus* PEMPELIA.

PEMPELIA CARBONARIELLA.

Plentiful in Jackson's Wood.

PEMPELIA PALUMBELLA.

Not rare. Has been taken in Jackson's Wood.

*Genus* ANERASTIA.

ANERASTIA LOTELLA

Common. New Brighton.

*Genus* EPHESTIA.

EPHESTIA ELUTELLA.

Rare.

EPHESTIA INTERPUNCTELLA.

Rare.

*Genus* HOMŒOSOMA.

HOMŒOSOMA NIMBELLA.

Not rare at New Brighton in 1853, to which locality it seems to be confined.—  
*Mr. Warrington.*

HOMŒOSOMA ELUVIELLA.

Not common.

*Genus* CHIMABACCHE.

CHIMABACCHE PHRYGANELLA.

Rare.

CHIMABACCHE FAGELLA.

Very common.

*Genus* SEMIOSCOPIS.

SEMIOSCOPIS AVELLANELLA.

Rare. Caught in Jackson's Wood.

SEMIOSCOPIS STEINKELLNERIANA.

Not very common. Tranmere and elsewhere.

*Genus* TALŒOPORIA.

TALŒOPORIA PSEUDO-BOMBYCILLA.

Found in 1853 sparingly at Bidston Hill.—*Mr. Warrington.*

*Genus* TINEA.

TINEA MASCULELLA.

Common.

THE FAUNA OF LIVERPOOL.

TINEA RUSTICELLA.

Common.

TINEA TAPETIELLA.

Common.

TINEA GRANELLA.

Common.

TINEA CORTICELLA.

Rare in hedges.

TINEA KNOCHIELLA.

Rather common at Tranmere.—*Mr. Warrington.* Female Apterous.

TINEA BISELLIELLA.

Very common. Usually called "Destructor."

TINEA GANOMELLA.

In hedges. Not common.

TINEA CÆSIELLA.

Very common.

TINEA OXYACANTHELLA.

Upon thorn hedges. Plentiful.

TINEA CERASIELLA.

Common.

*Genus* OCHSENHEIMERIA.

OCHSENHEIMERIA BISONTELLA.

Common.

*Genus* MICROPTERYX.

MICROPTERYX CALTHELLA

Common.

MICROPTERYX SEPPELLA.

Common.

MICROPTERYX PURPURELLA.

Common.

*Genus* NEMATOPOGON.

NEMATOPOGON SWAMMERDANMELUS.

Eastham.

NEMATOPOGON SCHWARZIELLUS.

Common and general.

*Genus* ADELA.

ADELA VIRIDELLA.

Common at Prenton and Eastham.

*Genus* PLUTELLA.

PLUTELLA CRUCIFERARUM.

Very common, but more so at some times than others. In some seasons it may be said to be rare.

PLUTELLA FISSELLA.

Not common.

PLUTELLA COSTELLA.

Rarely found, but generally distributed.

THE FAUNA OF LIVERPOOL.

PLUTELLA HARPELLA.

Very common.

*Genus* ANCHINIA.

ANCHINIA BICOSTELLA.

Common in Jackson's Wood.

*Genus* ŒCOPHORA.

ŒCOPHORA SULPHURELLA.

Plentiful.

ŒCOPHORA SUBAQUILEA.

Common on Bidston Hill.

ŒCOPHORA PSEUDOSPLETELLA.

New Brighton and elsewhere.

ŒCOPHORA FUSCESCENS.

Not uncommon.

ŒCOPHORA LACTEELLA.

The common clothes moth, everywhere.

ŒCOPHORA GRANDIPENNIS.

Not very common. Found where gorse abounds.

ŒCOPHORA CURTISELLA.

Common.

*Genus* HYPONOMEUTA.

HYPONOMEUTA PADELLUS.

Generally distributed. Common in Birkenhead Park.

HYPONOMEUTA COGNATELLUS.

Common also in Birkenhead Park.

*Genus* ORTHOTÆLIA.

ORTHOTÆLIA SPARGANIELLA.

Not common. Found in pits where bur reed grows.

*Genus* DEPRESSARIA.

DEPRESSARIA COSTOSA.

Common.

DEPRESSARIA LITURELLA.

Common at Bidston, New Brighton, and elsewhere.

DEPRESSARIA ULICITELLA.

Common amongst gorse bushes.

DEPRESSARIA ARENELLA.

Rare. Found at Tranmere.

DEPRESSARIA PROPINQUELLA.

Common.

DEPRESSARIA SUB-PROPINQUELLA.

Rare at Tranmere. Three specimens 1853.—*Mr. Warrington.*

DEPRESSARIA ALSTRÆMERIANA.

Not uncommon, especially at New Brighton.

DEPRESSARIA PURPUREA.

Not rare. New Brighton.

THE FAUNA OF LIVERPOOL.

DEPRESSARIA CONTERMINELLA.

Rare. New Brighton. Eight taken in 1853.—*Mr. Warrington.*

DEPRESSARIA CHARACTERELLA.

Common.

DEPRESSARIA YEATIANA.

Common. Storeton.

DEPRESSARIA APPLANA.

Very common.

DEPRESSARIA CILIELLA.

Common.

DEPRESSARIA NERVOSA.

Common about gorse bushes.

DEPRESSARIA PASTINACELLA.

Rare. Bidston Hill.—*Mr. Warrington.*

DEPRESSARIA HERACLEANA.

Common.

*Genus* CARCINA.

CARCINA FAGANA.

Common about oaks.

*Genus* GELECHIA.

GELECHIA POPEULELLA.

Common. New Brighton.

GELECHIA ISABELLA.

Abundant at New Brighton and elsewhere. Not common at Tranmere in 1853.

*Mr. Warrington.*

GELECHIA GALLINELLA

Common.

GELECHIA TRICOLORELLA.

Common.

GELECHIA MARMOREA.

Local. Not uncommon at New Brighton.

GELECHIA DOMESTICA.

Common everywhere.

GELECHIA TERRELLA.

Common.

GELECHIA DESERTELLA.

Not plentiful. New Brighton.

GELECHIA DIFFINIS.

Local, but common at New Brighton.

GELECHIA PROXIMELLA.

Common and generally distributed.

GELECHIA LIGULELLA.

Tranmere and New Brighton. Rare.

GELECHIA ANTHYLLIDELLA.

Local, but plentiful at New Brighton.



THE FAUNA OF LIVERPOOL.

GELECHIA AFFINIS.

Common at New Brighton. Local.

GELECHIA MUNDELLA.

New Brighton. Not very abundant.

GELECHIA DODECELLA.

Not very common.

GELECHIA VULGELLA.

Not plentiful.

GELECHIA LUCULELLA.

Common.

GELECHIA CONSCRIPTELLA.

Not rare about nut bushes.

GELECHIA LAPPELLA.

Two specimens at Dacre Park, in 1853.—*Mr. Warrington.*

*Genus* RÖSLERSTAMMIA.

RÖSLERSTAMMIA FUSCOVIRIDELLA.

Very common.

*Genus* GLYPHIPTERYX.

GLYPHIPTERYX VARIELLA.

Rare. Larva found in the neighbourhood of Birkenhead, bred by Mr. Almond, 1853.

*Genus* ÆCHMIA.

ÆCHMIA THRASONELLA.

Common in damp places.

ÆCHMIA EQUITELLA.

Abundant everywhere.

ÆCHMIA SERICIELLA.

Not very common.

*Genus* ARGYRESTHIA.

ARGYRESTHIA NITIDELLA.

Common.

ARGYRESTHIA SEMITESTACELLA.

Uncommon; taken at Bidston.

ARGYRESTHIA ALBISTRIA.

Common.

ARGYRESTHIA CONJUGELLA.

Taken at Bidston; not common.

ARGYRESTHIA RETINELLA.

Common.

ARGYRESTHIA CURVELLA.

Common.

ARGYRESTHIA PYGMÆELLA.

Common.

ARGYRESTHIA GOEDARTELLA.

Not common.

THE FAUNA OF LIVERPOOL.

ARGYRESTHIA BROOKEELLA.

Common.

ARGYRESTHIA FARINATELLA.

Not rare; generally distributed.

*Genus* OCNEROSTOMA.

OCNEROSTOMA PINIARIELLA.

Common in fir woods.

*Genus* COLEOPHORA.

COLEOPHORA SPISSICORNIS.

Rare; one specimen taken by Mr. Almond.

COLEOPHORA ALCYONIPENNELLA.

Not uncommon.

COLEOPHORA OCHREA.

Specimens taken by Messrs. Almond, Warrington, and Brockholes, 1853.

COLEOPHORA ALBICOSTA.

Very common.

COLEOPHORA TILIELLA.

Caught at Bidston. Not uncommon.

COLEOPHORA CURRUCIPENNELLA.

Common.

COLEOPHORA CÆSPITITIELLA.

Common.

COLEOPHORA ALTICOLELLA.

Common.

COLEOPHORA JUNCICOLELLA.

Common.

COLEOPHORA LUTAREA.

Common.

*Genus* GRACILARIA.

GRACILARIA FRANCKELLA.

Common.

GRACILARIA STIGMATELLA.

Rare. Found at Storeton by Mr. Warrington.

GRACILARIA INCONSTANS.

A specimen found by Mr. Warrington at Storeton, April, 1853.

GRACILARIA ELONGELLA.

Common at Tranmere.

GRACILARIA SYRINGELLA.

Common.

*Genus* ORNIX.

ORNIX MELEAGRIPENELLA.

Rare at Dacre Park.—*Mr. Diggles*. Tranmere.—*Mr. Warrington*.

ORNIX ANGLICELLA.

Common.

ORNIX SCOTICELLA.

Common.

THE FAUNA OF LIVERPOOL.

ORNIX GUTTEA.

Not common. Taken at Tranmere and elsewhere.

Genus ELACHISTA.

ELACHISTA TESTACELLA.

Common.

ELACHISTA ATRA.

Tranmere.

ELACHISTA LINNÆELLA.

Rare; one specimen taken by Mr. Brockholes in Tranmere; others at Tranmere by Mr. Warrington.

ELACHISTA FLAVICAPUT.

Common.

ELACHISTA FESTALIELLA.

Common.

ELACHISTA MODESTELLA.

Not common; specimens taken at Tranmere.

ELACHISTA ALBIFRONTILLA.

Common.

ELACHISTA LUTICOMELLA.

Common.

ELACHISTA BEDELLELLA.

Common.

ELACHISTA PFEIFFERELLA.

Rare; taken by Mr. Diggles; locality forgotten.

ELACHISTA ALBINELLA.

Common at Tranmere.—*Mr. Warrington.*

ELACHISTA CERUSSELLA.

Not common.

ELACHISTA RUFOCINEREA.

Common.

ELACHISTA CYGNIFENNELLA.

Common.

Genus LYONETIA.

LYONETIA CLERKELLA.

Rather rare. Jackson's Wood.

Genus PHYLLOCNISTIS.

PHYLLOCNISTIS SUFFUSELLA.

Tranmere. Rare.—*Mr. Warrington.*

Genus CEMIOSTOMA.

CEMIOSTOMA SPARTIFOLIELLA.

Common amongst broom.

CEMIOSTOMA SCITELLA.

Common.

THE FAUNA OF LIVERPOOL.

*Genus* BUCCULATRIX.

BUCCULATRIX CRATÆGI.

Rare. Dacre Park.

BUCCULATRIX BAYERELLA.

Dacre Park. Rare.

*Genus* NEPTICULA.

NEPTICULA PYGMÆELLA.

Common.

NEPTICULA AURELLA.

Taken at Claughton about oaks. Not common.

NEPTICULA GRATIOSELLA.

Common.

*Genus* TISCHERIA.

TISCHERIA COMPLANELLA.

Common.

TISCHERIA MARGINEA.

Common.

*Genus* LITHOCOLLETIS.

LITHOCOLLETIS QUINQUEGUTTELLA.

New Brighton.

LITHOCOLLETIS POMIFOLIELLA.

Common, and generally distributed.

LITHOCOLLETIS POMONELLA.

Common.

LITHOCOLLETIS QUERCIFOLIELLA.

Common.

LITHOCOLLETIS CORYLIFOLIELLA.

Common.

LITHOCOLLETIS ALNIFOLIELLA.

Common.

LITHOCOLLETIS CRAMERELLA.

Common.

LITHOCOLLETIS SYLVELLA.

Not uncommon.

LITHOCOLLETIS FROLICHIELLA.

Rare. Taken at Tranmere.

LITHOCOLLETIS KLEEMANNELLA.

Taken at Tranmere. Not rare.

LITHOCOLLETIS TRISTRIGELLA.

Not very common. General.

LITHOCOLLETIS TRIFASCIELLA.

Rather scarce. Tranmere and Dacre Park.

*Genus* PTEROPHORUS.

PTEROPHORUS OCHRODACTYLUS.

Rare. One specimen taken by Mr. Diggles.

## THE FAUNA OF LIVERPOOL.

### PTEROPHORUS TRIGONODACTYLUS.

Not common. Occasionally taken in localities wide apart.

### PTEROPHORUS PARVIDACTYLUS.

Taken but seldom, amongst gorse.

### PTEROPHORUS BIPUNCTIDACTYLUS.

Common. New Brighton.

### PTEROPHORUS FUSCUS.

New Brighton. Not common.

### PTEROPHORUS PTERODACTYLUS.

Common.

### PTEROPHORUS PENTADACTYLUS.

Common.

### Genus ALUCITINA.

### ALUCITINA POLYDACTYLA.

Common.

## CLASS ANNELIDES.

*Not having any systematic work of reference to the Annelides, I put the list of species hitherto found on the coast without arrangement.*

### TEREBELLA CONCHILEGA.

General about the shore.

### TEREBELLA NEBULOSA.

Hilbre.

### AMPHITRITE AURICOMA.

Very fine specimens forming a perfect garden, at Hilbre. Smaller at Egremont and New Brighton.

### SABELLARIA ALVEOLATA.

New Brighton, Caldy Blacks, and Hilbre, very abundant.

### SABELLARIA UNISPIRA.

Hilbre.

### NAIS FILIFORMIS.

Abundant in many fresh water ditches, forming blood-like patches, which suddenly disappear when irritated.

### NAIS PELLUCIDA ?

Not tubular, in a ditch near Upton.

### NEREIS MARGARITACEA.

Common on the shores.

### NEREIS VIRIDIS.

Not uncommon.

### NEMERTES OCTOCULATA.

Found upon oysters.—*Mr. Weightman.*

### BORLASIA NIGRA.

Dr. Edwards gave me a specimen which he took at New Brighton.

### ARENICOLA PISCATORUM.

Very abundant, and used as bait.

### APHRODITA ACULEATA.

Once at Leasowe, and rarely on other parts of the shore.

THE FAUNA OF LIVERPOOL.

MYRIANDRIDA FASCIATA.

Hilbre.

NEPHTHYS HOMBERGII.

Hilbre.

POLYNOE CIRRATA.

Hilbre, New Brighton. On other places in rocky pools.

POLYNOE SQUAMATA.

Found as the former.

PHYLLODOCE VIRIDIS.

A beautiful worm, lives well in captivity. Not very uncommon.

SYLLIS ARMARILLIS.

Not common.

OPHELIA ————— ?

Not common.

SPIRORBIS LUCIDA.

Parasitic upon "*Sertularia Abietina*."

SPIRORBIS NAUTILOIDES.

Parasitic upon "*Fucus*."

SPIRORBIS RUGOSA.

Variouly parasitic.—*Mr. Marratt*.

PONTOBELLA MURICATA.

A suctorial Annelide, attached to Rays and other large fishes.

HEMOPIS SANQUISORBA.

Very common.

LUMBRICUS TERRESTRIS.

Very common.

NEPHELIS ELEGANS.

A fresh water suctorial Annelide. Found in a running stream near Saughall Massie.

CLEPSINE ————— ?

Two or three species taken in the same locality.

PLANARIA FUSCA.

Abundant in ponds and ditches.

PLAGARIA NIGRA.

Abundant in ponds and ditches.

A large, extremely thin, transparent, broad, marine planaroid was taken at Hilbre Island. It lived about two months afterwards in sea water; after having been three weeks in captivity, a slight notch formed in the thin edge of one side which gradually extended across the middle of the animal, and in about a week, the head and tail ends had quite separated from each other; the vitality and activity of each portion remaining as before, and continuing for a month afterwards; the head division lived longer than the other, but both gradually lost substance, the active movements of the remnants being persistent as long as could be observed.

A marine suctorial species, found between the branchial leaflets of "*Pholas Crispata*."

## THE FAUNA OF LIVERPOOL.

### SERPULA MULLERI.

Attached to stones, shells, &c.

### SERPULA VERMICULARIS.

Upon shells and stones.

### VERMILIA TRIQUETRA.

One species from Hilbre Island was sent to Dr. Williams, of Swansea, who pronounced it to be "new," but it has not been named.

## SUB-KINGDOM 4.—RADIATA.

### CLASS ACALEPHÆ.

#### Order DISCOPHORÆ.

##### PULMOGRADA.

##### STEGANOPHTHALMATA. EYES COVERED.

###### Genus AURELIA.

### AURELIA AURITA.

Mr. Price, who has paid great attention to this beautiful tribe of animals, finds this species most abundantly about the month of May every year.

### CHRYSAORA HYOSCELLA.

Rare. Seen mostly during the months of July and August.

###### Genus RHIZOSTOMA.

### RHIZOSTOMA PULMO.

This large species may be considered rare in the district. Mr. Price informs me that he has commonly observed about three or four in a year. Mostly seen in the month of September and later in the year.

###### Genus CYANÆA.

### CYANÆA CAPILLATA.

A very common species. Appears on our shores from July to October. Mr. Price has observed a yellow Medusa very like this species, during the May month.

##### GYMNOPHTHALMATA. NAKED-EYED MEDUSÆ.

###### Family OCEANIDÆ.

###### Genus TURRIS.

### TURRIS NEGLECTA.

Has been taken rarely in the Mersey by Mr. Price.

###### Family GERYONIADÆ.

###### Genus THAUMANTIAS.

### THAUMANTIAS PUNCTATA.

Rare in the Mersey.—Mr. Price.

###### Family SARSIADÆ.

###### Genus SARSIA.

### SARSIA TUBULOSA.

Caught in the Mersey. Rare.—Mr. Price.

## THE FAUNA OF LIVERPOOL.

### *Genus* LIZZIA.

#### LIZZIA OCTOPUNCTATA.

Taken, by Mr. Price, in the river. Other minute Medusoids have been observed, which, not having been referred to any published species, are probably the protei of zoophytes, &c.

### *Order* CILIOGRADA.

#### *Genus* CYDIPPE.

#### CYDIPPE PILEUS.

Found mostly early in April, but also, more sparingly, at other times.

#### CYDIPPE POMIFORMIS.

Very rare. Appears at no certain periods of the year.—*Mr. Price.*

#### *Genus* BEROE.

#### BEROE OVATA.

Irregular in the time of its appearance, but sometimes as early as "Cydippe Pileus."

#### *Genus* NOCTILUCA.

#### NOCTILUCA MILIARIS.

In the Mersey in myriads. It is this species chiefly which imparts a phosphorescent appearance to the water at nights, as may be proved at any time by taking some of the river water containing them into a perfectly dark room, and splashing it about with any hard body to irritate them. They may be seen as little hyaline-globules about the size of a pin's head. Three or four years ago, in company with Mr. Price, we saw millions of them collected together at Hilbre Island, in a little pool, when they tinged a portion of the water, about two yards in circumference, with a deep pink colour. The individuals in this collection were of a light pink hue under the microscope; those from the river are colourless. The men upon the ferry steamers state that the phosphorescent appearance of the water is much more noticed some years than others. They associate its presence with southwardly winds.

## CLASS ECINODERMATA.

### OPHIURIDÆ.

#### *Family* OPHIURÆ.

##### *Genus* OPHIURA.

#### OPHIURA TEXTURATA. Common Sand-star.

Taken at Hilbre. Dredged round the coast.

#### OPHIURA ALBIDA. Lesser Sand-star.

Dredged about the mouth of the Dee, and north of Wirral.

##### *Genus* OPHIOCOMA.

#### OPHIOCOMA NEGLECTA. Gray Brittle Star.

Taken among sea-weed and sponge at Hilbre Island.



## THE FAUNA OF LIVERPOOL.

### OPHIOCOMA ROSULA. Common Brittle Star.

Taken plentifully under the same circumstances as the former.

## ASTERIADÆ.

### Family URASTERIÆ.

#### Genus URASTER.

### URASTER RUBENS. Common Cross Fish.

The most common species of the coast. It may be seen everywhere upon the shores.

### Family SOLASTERIÆ.

#### Genus SOLASTER.

### SOLASTER PAPPOSA. Common Sun-star.

Not uncommon at Hilbre Island, Caldy Blacks, New Brighton, and other parts of the coast. Mr. Price was good enough to forward me drawings of an animal which he caught in the Mersey. He observes, "It is of a yellowish transparent colour. The essential organs seem very lightly put together, but are secured and protected by two ample membraneous cloaks, one dorsal and the other ventral, with two long posterior feelers, bulbed and coloured, extremely flexible and busy, and causing strong ciliary currents in the water of their vicinity. Form varies greatly with position. The anterior portion of the body is furnished with three stunted "fingers," which are roughened at their extremity and adhesive, enabling the creature to move as a cœphalopod, by all three. Swims slowly, as by "cilia." It is very small, perhaps the size of a small Cypris. It has a contracted stomach in the centre of the animal, having the shape of a Florence flask, with a broad infundibuliform mouth, from the sides of the body proceed six apparently tubular projections. Professor Forbes, who saw the drawings, pronounced the animal to be a Proteus of some species of Star-fish.

## ECHINIDÆ.

### Family CIRADITES.

#### Genus ECHINUS.

### ECHINUS SPHERA. Common Egg Urchin.

Mr. Marratt has taken one or two specimens which have been thrown upon the shore.

### ECHINUS MILIARIS.

Taken sparingly in the dredge at the entrance of the Dee.

### Family CLYPEASTERIÆ.

#### Genus ECHINOCYAMUS.

### ECHINOCYAMUS PUSILLUS. Green Pea Urchin.

Several taken by dredging.

### Family SPATANGACEÆ.

#### Genus AMPHIDOTUS.

### AMPHIDOTUS CORDATUS. Common Heart Urchin.

Living specimens dredged; dead shells commonly scattered about our shores.

THE FAUNA OF LIVERPOOL.

HOLOTHURIADÆ.

*Family* PENTACTÆ.

*Genus* CUCUMARIA.

CUCUMARIA COMMUNIS. Common Sea Cucumber.

Very rare; one specimen only has been given to me by a fisherman at Hoylake, who was much surprised at its appearance.

CLASS ZOOPHYTA.

ANTHOZOA HYDROIDA.

TUBULARINA.

*Family* CORYNIDÆ.

*Genus* CLAVA.

CLAVA MULTICORNIS.

Abundant upon loose and floating Fuci washed into the Mersey.—*Mr. Price.*

*Genus* HYDRACTINIA.

HYDRACTINIA ECHINATA.

Parasitic upon dead shells. Not uncommon.

*Genus* CORYNE.

CORYNE PUSILLA.

Found by *Mr. Price* upon the Dingle rocks. *Mr. Tudor* has taken it at Bootle.

*Family* TUBULARIADÆ.

*Genus* EUDENDRIUM.

EUDENDRIUM RAMEUM.

Shores near Liverpool.—*Thos. G. R. Rylands.* "Johnston's British Zoophytes."  
(p. 45.) About the North Shore; not common.

EUDENDRIUM RAMOSUM.

Bootle Shore; not unfrequent.—*Mr. Marratt.*

*Genus* TUBULARIA.

TUBULARIA INDIVISA.

Very abundant at Hilbre Island, New Brighton, and upon the Mersey shore generally.

TUBULARIA LARYNX.

Very common round the coast, variously parasitic.

SERTULARINA.

*Family* SERTULARIADÆ.

*Genus* HALECTUM.

HALECTUM HALECINUM.

General and abundant upon rocks in tide-pools, at the verge of low water mark, and drifted on shore.

## THE FAUNA OF LIVERPOOL.

### Genus SERTULARIA.

#### SERTULARIA POLYZONIAS.

Not uncommon among drift seaweeds. Seldom or ever found with living Polyps.

#### SERTULARIA RUGOSA.

Parasitic mostly upon "Flustra Foliacea." Frequently found.

#### SERTULARIA ROSACEA.

Found rarely at New Brighton and elsewhere; most commonly attached to "Plumularia Falcata."

#### SERTULARIA PUMILA.

Not common. Found by Mr. Marratt growing upon "Fucus Serratus" on a large stone between Seacombe and Egremont. Dead in other places amongst sea weed and zoophytes.

#### SERTULARIA MARGARITA.

Mouth of the Mersey,—*Mr. R. A. Tudor*. Amongst drifted sea weed at New Brighton.—*Mr. Marratt*.

#### SERTULARIA TAMARISCA.

Bootle coast.—*Mr. Tudor*. Sparingly but generally on both shores.

#### SERTULARIA ABIETINA.

Common upon the coast.

#### SERTULARIA FILICULA.

A general but not very abundant species.

#### SERTULARIA OPERCULATA.

Pretty general, without Polyps.—*Mr. Marratt*.

#### SERTULARIA ARGENTEA.

Very common.

#### SERTULARIA CUPRESSINA.

Not quite so common as the former.

### Genus THULARIA.

#### THULARIA ARTICULATA.

Hilbre, New Brighton, and elsewhere.

### Genus ANTENNULARIA.

#### ANTENNULARIA ANTENNINA.

Picked up frequently, without Polyps.

#### ANTENNULARIA RAMOSA.

Equally as common as the last species.

### Genus PLUMULARIA.

#### PLUMULARIA FALCATA.

In rocks, &c., in pools at low water, frequent.

#### PLUMULARIA CRISTATA.

On the Bootle coast. Rare.—*Mr. Tudor*. Frequently found with Polyps alive parasitic upon "Halidrys Siliquosa."—*Mr. Marratt*.

#### PLUMULARIA SETACEA.

Not common. Found mostly at Bootle, also at New Brighton.

THE FAUNA OF LIVERPOOL.

PLUMULARIA MYRIOPHYLLUM.

Very rare. Found once at Waterloo and again between Seacombe and Egremont, drifted ashore.—*Mr. Marratt.*

*Family* CAMPANULARIADÆ.

*Genus* LAOMEDEA.

LAOMEDEA DICHOTOMA.

Growing in small tide pools.

LAOMEDEA GENICULATA.

Very abundant upon Algæ, dead shells, &c.

LAOMEDEA GELATINOSA.

About equally common, and attached in the same manner.

*Genus* CAMPANULARIA.

CAMPANULARIA VOLUBILIS.

Adhering to shells and Fuci in pools on the shores.

CAMPANULARIA SYRINGA.

In the same situations, but less frequent.

CAMPANULARIA VERTICILLATA.

Very common.

CAMPANULARIA DUMOSA.

Common, parasitic upon zoophytes, &c. Drifted ashore dead.

HYDRINA.

*Family* HYDRAIDÆ.

*Genus* HYDRA.

HYDRA VIRIDIS.

In various ponds and ditches. Somewhat local.

HYDRA VULGARIS.

In ponds; perhaps rather more common than the last.

ANTHOZOA ASTEROIDA.

*Family* ALCYONIDÆ.

*Genus* ALCYONIUM.

ALCYONIUM DIGITATUM.

Found very abundantly at Hilbre Island at low ebbs; deep orange and pure white varieties. May be seen also at New Brighton, and in pools at Egremont, where the specimens are very small.

ANTHOZOA HELIANTHOIDA.

*Family* ACTININA.

*Genus* ACTINIA.

ACTINIA MESEMBRYANTHEMUM.

Mr. Price states that he met once with this species upon our shore. I have a specimen now alive which I took at Hilbre. Rare on this coast until this year, when several have been taken.

## ACTINIA TROGLODITES.

Has been found in pretty good numbers upon the Leasowe shore and near Egremont slip. I have kept as many as eight or ten together for upwards of six weeks. They were often very ill used for want of a fresh supply of sea water, but seemed to be most tolerant under the infliction. It was seldom until after having been kept for ten or twelve days in the same water, that they began to droop considerably, and they were speedily restored by a change. No food was given at any time. At first they threw off a great number of germs or ova, which, before they were extruded, could be plainly seen through the external envelope, and especially at the bases of those specimens which had not attached themselves, and could be turned over for examination. It appeared quite clear to me that these germs, young actinæ, (or whatever they may properly be called,) made their exit through breaches of continuity in the outer envelope, near its junction with the basal disk, and sometimes through ragged apertures in the base itself; in fact, I have hooked out the germs which were just on the point of emerging with a blunt probe, which was delicately used, and *did not make* the opening. The germs were about the size of a pin's head, and perfectly globular; they showed, by careful watching, a very sluggish motion. Three or four were put into a wide-necked 1½ oz. bottle, having a ground glass stopper, with some sea water, and were intended for a microscopic inspection in the evening; they were quite forgotten, however, and at the expiration of two months one was found to have become developed into a perfect but very small actinia, the oral disk with the tentacles being fully and beautifully expanded. It is now (after six months) alive, but has never increased in size; it continues closely shut up, when there is a fresh supply of water, for some days, but after a week, and from that to a fortnight, fully expands again. For this reason the water has not been changed more than six times since it has been in my possession. No pabulum of any kind has ever been given. It seems to make no difference whether the stopper is kept in the bottle or not, so far as the animal's health is concerned. These creatures were shy of expanding during the day, and then were as flat as a coin. I used always to pay them a visit before bedtime, knowing that I should be repaid by a view of their full-blown expansion during the previous darkness; the stimulus of candlelight used to set their tentacula in active motion, without making them "retire for the night."

## ACTINIA CORIACEA.

By far the most common actinæ of the shores, greatly varied in size and colour.

At Hilbre Island rich brown spotted specimens, with white tentacula, are found, which Mr. Alder thinks to be the fry of this species.

Some time ago, whilst examining the contents of the tubular organs in the compartments between the septa of this species, the field of the microscope was covered with numerous transparent spicula, very much like the raphides of "Lemna," but truncated at each end; some of these were observed to form the anterior part of what I suppose to be spermatozoa. The posterior portion of each spiculum had a very slight but sufficiently obvious attachment to a wavy neck, a small cilium being placed at each undulation; the rest of the body tapered off as in the spermatozoa of other creatures: they were living and moving. It was remarkable to see so many of the crystalline

## THE FAUNA OF LIVERPOOL.

heads floating freely in the field, and so few attached in a perfect condition ; this must have arisen from the looseness of adhesion between the neck and head admitting of their being severed by the most light-handed manipulation, in placing them under the microscope.

### ACTINIA CRASSICORNIS.

Mr. Price states that he has seen this species at New Brighton.

### ACTINIA DIANTHUS.

Hilbre Island, at low ebbs ; some specimens pure white, and others of a deep buff colour. The white variety plentiful at the Dingle shore.

## POLYZOA INFUNDIBULATA.

### *Family* TUBULIPORINA.

#### *Genus* TUBULIPORA.

### TUBULIPORA SERPENS.

Parasitic upon "Plumularia Falcata ;" rather rare ; found dead between Seacombe and Egremont.

### *Family* CRISIADÆ.

#### *Genus* CRISIA.

### CRISIA EBURNEA.

Very common. Parasitical on Algae, &c.

### CRISIA DENTICULATA.

Found at Leasowe, without Polyps, by the Rev. H. H. Higgins.

## CELLEPORINA.

### *Family* EUCRATIADÆ.

#### *Genus* GEMELLARIA.

### GEMELLARIA LORICULATA.

Not uncommon, either in tide pools or by the dredge.

### *Family* CELLEPORIDÆ.

#### *Genus* CELLEPORA.

### CELLEPORA PUMICOSA.

Not rare upon the stems of zoophytes and sea weeds.

#### *Genus* MEMBRANIPORA.

### MEMBRANIPORA PILOSA.

Diffused over the surface of stones, dead shells, Fuci, &c.

### MEMBRANIPORA MEMBRANACEA.

Found under the same circumstances as the former species, rather less frequently.

### *Family* ESCHARIDÆ.

#### *Genus* CELLULARIA.

### CELLULARIA CILIATA.

Attached to zoophytes. Not common.

### CELLULARIA SCRUPOSA.

Found mostly upon "Flustra Foliacea." Not an uncommon species.

## THE FAUNA OF LIVERPOOL.

### CELLULARIA REPTANS.

Parasitic upon various species of zoophytes. The most common species of the genus here.

### CELLULARIA AVICULARIA.

Met with occasionally at Hilbre, and sparingly round the coast.

### CELLULARIA NERITINA.

Coast of Cheshire, found by Miss Blackburne. "Johnston's British Zoophytes."

### CELLULARIA PLUMOSA.

Found on the Bootle shore by Mr. Marratt.

#### *Genus FLUSTRA.*

### FLUSTRA FOLIACEA.

Very plentiful.

### FLUSTRA CHARTACEA.

Very scarce. Taken near Hilbre.

### FLUSTRA AVICULARIS.

Parasitic upon "Flustra Foliacea" at low water, Cheshire shore near Seacombe.

Is becoming scarce.—*Mr. Marratt.*

#### *Genus SALICORNARIA.*

### SALICORNARIA FARCIMINOIDES.

Loose pieces without Polyps taken on the shores occasionally.

## HALCYONELLEA.

#### *Genus ALCYONIDIUM.*

### ALCYONIDIUM GELATINOSUM.

Taken abundantly all round the coast.

### ALCYONIDIUM HIRSUTUM.

Plentiful in tide-pools, and taken in the dredge.

### ALCYONIDIUM PARASITICUM.

Parasitical upon "Sertularia."

#### *Genus CYCLOUM.*

### CYCLOUM PAPILLOSUM.

Parasitic on "Fucus Serratus."

## VESICULARINA.

### *Family VESICULARIADÆ.*

#### *Genus SERIALARIA.*

### SERIALARIA LENDIGERA.

Not very rare; found parasitically mostly upon "Halidrys Siliquosa".—*Mr. Marratt.*

#### *Genus VESICULARIA.*

### VESICULARIA SPINOSA.

In tide pools alive. Also amongst tufts of other drift zoophytes on the shore.  
Common.

## THE FAUNA OF LIVERPOOL.

### *Genus VALKERIA.*

#### **VALKERIA CUSCUTA.**

Parasitic upon Fuci ; very uncommon.

### *Genus BOWERBANKIA.*

#### **BOWERBANKIA IMBRICATA.**

I found this species spread over the surface of dead Flustra, at Hilbre, in a single layer, as it is described in "Johnston's Zoophytes," (p. 397,) under the name of "Bowerbankia Densa." A beautiful specimen, in its confervoid condition, at Hilbre, August, 1854. Mr. Price has met with it very rarely.

## POLYZOA HYPOCREPIA.

### *Family CRISTATELLIDÆ.*

#### *Genus CRISTATELLA.*

#### **CRISTATELLA MUCEDO.**

Mr. Price informs me that he has taken this species in a pond amongst yellow water lillips. The animals were mostly attached to the under surface of those leaves which were becoming yellow by age.

## *Class SPONGIA.*

## AMORPHOZOA.

### *Genus HALICHONDRIA.*

#### **HALICHONDRIA OCULATA.**

At Hilbre, New Brighton, &c., on rocky places.

#### **HALICHONDRIA PANICEA.**

Most abundant, especially at Hilbre Island, Caldy Blacks, and New Brighton.

#### **HALICHONDRIA FUCORUM.**

Found occasionally investing "Sertulariæ."

#### **HALICHONDRIA CRLATA,**

Burrowing in the shells of "Fusus," "Ostrea," &c.

#### **HALICHONDRIA SUBERIA.**

Shells encrusted with this species, and taken by the fishermen not far from the coast, have been given to me occasionally.



## A D D E N D A .

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### PISCES.

#### *Genus* COTTUS.

COTTUS SCORPIUS. Short-spined Cottus or Sea Scorpion.

Caught off Leasowe by Mr. E. T. Higgins.

#### *Genus* MUGIL.

MUGIL CHELO. Thick-lipped Grey Mullet.

Taken between the two floats or docks at Birkenhead.

#### *Genus* BLENNIUS.

BLENNIUS PHOLIS. Shanny or Smooth Shan

Caught in the Mersey by Mr. E. T. Higgins.

#### *Genus* CALLIONYMUS.

CALLIONYMUS DRACUNCULUS. The Sordid Dragonet.

Taken by Mr. E. T. Higgins, between Leasowe Lighthouse and New Brighton, in trawl nets.

#### *Genus* AMMOCÆTES.

AMMOCÆTES BRANCHIALIS. The Pride. Sand-pride.

Taken plentifully at Bromborough Pool by Mr. Higgins. Probably this may be the species surmised to be "*Petromyzon Planeri*," which was seen in the Alt.

Mr. Higgins informed me that he has seen three specimens of Flounder, dark upon both sides, and having a deep notch in the dorsal outline, at the junction of the head with the body. There was also a somewhat different fin arrangement from that of the ordinary "*Platessa Flesus*." They were from Wallasey Pool.

### MOLLUSCA.

#### *Genus* NASSA.

NASSA INCRASSATA.

Mr. Whitehead informs me that this species has been taken dead on the North shore.

## MYRIOPODA.

*These species were not named in time to be placed in their proper situation after "Insecta." Mr. Adam White has obliged me by examining my specimens and comparing them with those in the British Museum.*

### **JULUS TERESTRIS.**

Extremely common in soil and under stones.

### **LITHOBIUS VARIEGATUS.**

Found in the same situations.

### **CRASPEDOSMA POLYDESMOIDES.**

In gardens, &c.

### **POLYDESMUS COMPLANATUS.**

In gardens and other places.

### **GEOPHILUS SUBTERRANEUS.**

Frequent in freshly turned up soil, and in damp places.

### **GEOPHILUS ELECTRICUS.**

A specimen, which was visibly phosphorescent and left a luminous mark behind it when crawling, was seen by Mr. C. Robin, at West Kirby.

### **ONISCUS MURARIUS.**

Very abundant about walls, rubbish, and damp localities.

### **GLOMERIS MARGINATA.**

Common under stones, about hedgerows or meadows.

### **ARMADILLIUM VULGARE.**

Found in like localities to the latter species.

# ERRATA.

Page	5,	for	Vespertilionidæ,	read	Vespertilionidæ.
"	9,	"	Phocæina,	"	Phocæna.
"	10,	"	Falconidæ,	"	Falconidæ.
"	30,	"	Whiting-pot,	"	Whiting-pout.
"	35,	"	Tellinida,	"	Tellinidæ.
"	90,	"	Plagaria	"	Planaria.
"	101,	"	Ecinodermata,	"	Echinodermata.

# ALPHABETICAL INDEX

## OF THE

### ORDERS, FAMILIES, AND GENERA.

#### MAMMALIA.

	Page.		Page.
Arvicola .....	8	Mustela .....	6
Asinus .....	8	Martes .....	7
Bovidae (Fam.) .....	8	Myoxus .....	7
Bos .....	8	Muridae (Fam.) .....	7
Chairoptera (Ord.) .....	5	Mus .....	7
Carnivora (Ord.) .....	6	Ovis .....	8
Canidae (Fam.) .....	7	Plecotus .....	5
Canis .....	7	Phocidae (Fam.) .....	6
Castoridae (Fam.) .....	8	Phoca .....	7
Cavia .....	8	Pachydermata (Order) .....	8
Capridae (Fam.) .....	8	Phocæna .....	9
Capra .....	8	Rhinolophidae (Fam.) .....	5
Cetacea (Ord.) .....	9	Rodentia (Order) .....	7
Delphinidae (Fam.) .....	9	Ruminantia (Order) .....	8
Erinaceidae (Fam.) .....	6	Soricidae (Fam.) .....	6
Erinaceus .....	6	Sorex .....	6
Equidae (Fam.) .....	8	Sciuridae (Fam.) .....	7
Equus .....	8	Sciurus .....	8
Felidae (Fam.) .....	7	Suidae (Fam.) .....	7
Felis .....	7	Sus .....	8
Hyperoodon .....	9	Talpidæ (Fam.) .....	6
Insectivora (Ord.) .....	6	Talpa Vulgaris .....	6
Lutra .....	6	Ursidae (Fam.) .....	6
Leporidae (Fam.) .....	8	Vespertilionidae (Fam.) .....	5
Lepus .....	8	Vespertilio .....	5
Meles .....	6	Vulpes .....	7
Mustelidae (Fam.) .....	6		

#### A V E S.

	Page.		Page.
Accipiter .....	10	Anatidae (Fam.) .....	20
Accentor .....	12	Anas .....	20
Ampelidae (Fam.) .....	13	Anser .....	20
Anthidae (Fam.) .....	13	Alcidae (Fam.) .....	22
Anthus .....	13	Alca .....	22
Alaudidae (Fam.) .....	13	Buteo .....	10
Alauda .....	13	Botaurus .....	18
Alcedo .....	16	Circus .....	10
Ardeidae (Fam.) .....	18	Curruca .....	12
Ardea .....	18	Conirostres (Division) .....	14

# INDEX.

	Page.		Page.
Coccothraustes .....	14	Mergulus .....	22
Carduelis .....	14	Nycticorax .....	18
Corvidæ (Fam.) .....	15	Numenius .....	18
Corvus .....	15	Natatores (Order) .....	20
Certhiade (Fam.) .....	16	Œdicnemus .....	17
Certhia .....	16	Otus .....	11
Cuculidæ (Fam.) .....	16	Oidemia .....	21
Cuculus .....	16	Pandion .....	10
Coracias .....	16	Pernis .....	10
Cypselus .....	16	Phœnicura .....	12
Caprimulgidæ (Fam.) .....	17	Paridæ (Fam.) .....	13
Caprimulgus .....	17	Parus .....	13
Columbidæ (Fam.) .....	17	Plectrophanes .....	14
Columba .....	17	Passer .....	14
Coturnix .....	17	Pyrrhula .....	14
Charadriidæ (Fam.) .....	17	Pastor .....	15
Charadrius .....	17	Pica .....	15
Calidris .....	18	Picidæ (Fam.) .....	15
Crex .....	19	Picus .....	15
Cygnus .....	20	Phasianidæ (Fam.) .....	17
Colymbidæ (Fam.) .....	21	Phasianus .....	17
Colymbus .....	22	Perdix .....	17
Dentirostres (Division) .....	11	Phalaropus .....	20
Erythraca .....	12	Podiceps .....	21
Emberizidæ (Fam.) .....	14	Pelecanidæ (Fam.) .....	22
Emberiza .....	14	Phalacrocorax .....	22
Falconidæ (Fam.) .....	10	Procellaria .....	23
Falco .....	10	Raptores (Order) ..	10
Fringillidæ (Fam.) .....	14	Regulus .....	12
Fringilla .....	14	Rasores (Order) ..	17
Fregilus .....	15	Rallidæ (Fam.) .....	19
Fissirostres (Division) .....	16	Rallus .....	20
Fulica .....	20	Strigidæ (Fam.) .....	11
Fuligula .....	21	Strix .....	11
Fratercula .....	22	Syrnium .....	11
Garrulus .....	15	Sylviadæ (Fam.) .....	12
Grallatores (Order) .....	17	Saxicola .....	12
Gallinula .....	20	Salicaria .....	12
Halieetus .....	10	Sylvia .....	12
Halcyonidæ (Fam.) .....	16	Sturnus .....	15
Hirundinidæ (Fam.) .....	16	Sturnidæ (Fam.) ..	15
Hirundo .....	16	Scansores (Division) .....	15
Hæmatopus .....	18	Squatorala .....	18
Insectores (Division) .....	11	Strepselas .....	18
Laniadæ (Fam.) .....	11	Scolopacidæ (Fam.) .....	18
Lanius .....	11	Scolopax .....	19
Linota .....	14	Somateria .....	21
Loxia .....	15	Sula .....	22
Lagopus .....	17	Sterna .....	22
Limosa .....	19	Turdus .....	11
Lobipedidæ (Fam.) .....	20	Troglodytes .....	16
Laridæ (Fam.) .....	22	Tetraonidæ (Fam.) .....	17
Larus .....	23	Tetrao .....	17
Lestris .....	23	Totanus .....	18
Mucicapidæ (Fam.) .....	11	Tringa .....	19
Muscicapa .....	11	Tadorna .....	20
Merulidæ (Fam.) .....	11	Thalassidroma .....	23
Motacillidæ (Fam.) .....	13	Upupa .....	16
Motacilla .....	13	Uria .....	22
Meropidæ (Fam.) .....	16	Vanellus .....	18
Machetes .....	19	Yuux .....	16
Mergus .....	21	Œdicnemus .....	17

# INDEX

## REPTILIA.

	Page.		Page
Anguidæ (Fam.)	24	Pelias	24
Anguis	24	Ranadæ (Fam.)	24
Amphibia (Order)	24	Rana	24
Anoura (Order)	24	Squamata (Sauria) (Order)	24
Buonidæ (Fam.)	24	Squamata (Saurophidæ) (Order)	24
Bufo	24	Salamandradæ (Fam.)	25
Colubridæ (Fam.)	24	Squamata Ophidia (Ord.)	24
Lacertadæ (Fam.)	24	Triton	25
Lacerta	24	Urodela (Order)	25
Lissotriton	25	Viperidæ (Fam.)	24
Natrix	24	Zootoca	24

## PISCES.

	Page.		Page.
Acanthopterygii (Ord.)	25	Mugilidæ (Fam.)	27
Acerina	25	Mugil	27 and 110
Aspidophorus	26	Muraenoides	27
Abdominales (Sub Ord.)	27	Malacopterygii (Ord)	27
Abramis	28	Malacopterygii (Sub Brachial)	30
Anguilla	32	Morrhua	30
Ammodytes	32	Merlangus	30
Acipenser	32	Merlucius	30
Acanthias	33	Motella	30
Ammocetes	110	Malacopterygii (Apodal)	32
Belone	29	Muraenidæ (Fam.)	32
Blennius	110	Osmerus	29
Cottus	26 and 110	Percidæ (Fam.)	25
Callionymus	27 and 110	Perca	25
Crenilabus	27	Pagellus	26
Cyprinidæ (Fam.)	27	Pleuronectidæ (Fam.)	32
Cyprinus	27	Platessa	30
Cobitis	29	Petromyzidæ (Fam.)	34
Clupeidæ (Fam.)	29	Petromyzon	34
Clupea	29	Rhombus	31
Cyclopteridæ (Fam.)	31	Raiidæ (Fam.)	33
Cyclopterus	31	Raia	33
Chondropterygii (Ord.)	32	Sebastes	26
Conger	32	Scomberidæ (Fam.)	26
Esocidæ (Fam.)	29	Scomber	26
Esox	29	Sparidæ (Fam.)	26
Engraulis	29	Sciæna	27
Gasterosteus	26	Salmonidæ (Fam.)	29
Gobiadæ (Fam.)	27	Salmo	29
Gobius	27	Solea	31
Gobio	28	Sygnathidæ (Fam.)	32
Gadidæ (Fam.)	30	Sygnathus	32
Galeus	32	Sturionidæ (Fam.)	32
Hippoglossus	31	Squalidæ (Fam.)	32
Labrax	25	Scyllium	32
Lampris	27	Squatina	33
Lophius	27	Trachinus	25
Labridæ (Fam.)	27	Trigla	25
Leuciscus	28	Tinca	28
Lota	30	Thymallus	29
Liparis	31	Torpedo	33
Leptocephalus	32	Trygon	33
Lopobranchii (Order)	32	Zeus	26

# INDEX.

## MOLLUSCA.

	Page.		Page.
Acephala Tunicata (Ord.)	34	Helicidae	46
Asciadiæ (Fam.)	34	Helix	47
Ascidia	34	Kelliadæ (Fam.)	37
Acephala Lamellibranchiata (Ord.)	34	Lutraria	36
Artemis	37	Lucinopsis	37
Anodonta	38	Littorinidæ (Fam.)	41
Aporrhais	41	Littorina	41
Anomia	39	Lacuna	41
Arcadæ (Fam.)	39	Limacidae (Fam.)	46
Ancula	44	Limax	46
Antiope	46	Limnæadæ (Fam.)	49
Arion	46	Limneus	49
Ancylus	50	Loligo	50
Auriculidæ (Fam.)	50	Myadæ (Fam.)	34
Bithinia	40	Mya	34
Buccinum	42	Mactridæ (Fam.)	36
Bullidæ (Fam.)	43	Mactra	36
Bulimus	48	Montacuta	37
Balea	48	Mytilidæ (Fam.)	38
Corbulidæ (Fam.)	35	Mytilis	39
Corbula	35	Modiola	39
Ceratisolen	35	Muricidæ (Fam.)	42
Cyprinidæ (Fam.)	37	Murex	42
Cyprina	37	Mangelia	43
Cardiadæ (Fam.)	37	Nucula	39
Cardium	37	Naticidæ (Fam.)	42
Cycladidæ (Fam.)	38	Natica	42
Cyclas	38	Nassa	42
Crenella	39	Octopodidæ (Fam.)	50
Chitonidæ (Fam.)	40	Ostreadæ (Fam.)	39
Chiton	40	Ostrea	39
Cerithiadæ (Fam.)	41	Pholadidæ (Fam.)	34
Conidæ (Fam.)	43	Pholas	34
Cypresadæ (Fam.)	43	Psammodia	35
Cyprea	43	Pisidium	38
Cylichna	43	Pecten	39
Clausilia	48	Patellidæ (Fam.)	40
Conovulus	50	Patella	40
Carychium	50	Paludinidæ (Fam.)	40
Cephalopoda Dibranchiata (Ord.)	50	Paludina	40
Donacidæ (Fam.)	36	Pyamidellidæ (Fam.)	42
Donax	36	Purpura	42
Dreissina	38	Philina	42
Dentaliadæ (Fam.)	40	Polycera	44
Dentalium	40	Pupa	48
Dorididæ (Fam.)	43	Physa	49
Doris	43	Planorbis	49
Dendronotus	45	Rissoa	41
Doto	45	Saxicava	34
Eulima	42	Solenidæ (Fam.)	35
Eolididæ (Fam.)	45	Solen	35
Eolis	45	Solecurtidæ (Fam.)	35
Embletonia	45	Syndosmya	36
Eledone	50	Scrobicularia	36
Fusus	42	Scalariadæ (Fam.)	41
Gastrochenide (Fam.)	34	Scalaria	41
Gasteropoda Prosobranchiata (Ord.)	40	Scaphander	43
Gasteropoda Opisthobranchiata (Or.)	43	Succinea	49

# INDEX.

	Page.
Sepiola .....	50
Sepiadæ (Fam.) .....	50
Sepia .....	50
Tellinidæ (Fam.) .....	35
Tellina .....	35
Tapes .....	37
Trochidæ (Fam.) .....	40
Trochus .....	40
Turritellidæ (Fam.) .....	41
Turritella .....	41
Tornatella .....	43

	Page.
Tritonidæ (Fam.) .....	44
Tritonia .....	44
Teuthidæ (Fam.) .....	50
Unionidæ (Fam.) .....	38
Veneridæ (Fam.) .....	37
Venus .....	37
Valvata .....	46
Vitrina .....	46
Zonites .....	46
Zua .....	49

## CRUSTACEA.

	Page.
Astacidæ (Fam.) .....	52
Acroporus .....	54
Alona .....	54
Arpacticus .....	55
Alteutha .....	55
Arcturus .....	56
Branchiopoda (Legion) .....	53
Bosmina .....	53
Balanidæ (Fam.) .....	56
Balanus .....	56
Canceridæ (Fam.) .....	51
Cancer .....	51
Carcinus .....	51
Corystidæ (Fam.) .....	52
Corystes .....	52
Crangonidæ (Fam.) .....	52
Crangon .....	52
Cladocera (Ord.) .....	53
Chydorus .....	54
Cypridæ (Fam.) .....	54
Cypris .....	54
Candona .....	54
Cytheridæ (Fam.) .....	54
Cythere .....	54
Copepoda (Ord.) .....	55
Cyclopidæ .....	55
Cyclops .....	55
Canthocamptus .....	55
Caligidæ (Fam.) .....	55
Caligus .....	55
Corophium .....	56
Caprella .....	56
Cirripedia (Division) .....	56
Conchoderma .....	56
Decapoda-Brachyura (Ord.) .....	51
Decapoda-Anomoura .....	52
Decapoda-Macroura (Ord.) .....	42
Daphniadæ (Fam.) .....	53
Daphnia .....	53
Diaptomidæ (Fam.) .....	55
Diaptomus .....	55
Entomostraca (Division) .....	53

	Page.
Eurycercus .....	53
Gonoplacidæ (Fam.) .....	51
Gonoplax .....	51
Galathea .....	52
Gammarus .....	56
Hyas .....	51
Homarus .....	52
Hippolyte .....	52
Leptopodiadæ (Fam.) .....	51
Lynceidæ (Fam.) .....	56
Lophyropoda (Legion) .....	54
Ligia .....	56
Limnoria .....	56
Lepadidæ (Fam.) .....	56
Lepas .....	56
Maiadæ (Fam.) .....	51
Macroura .....	52
Nymphon .....	56
Nephrops .....	52
Ostracoda (Ord.) .....	54
Pisa .....	51
Portunidæ (Fam.) .....	51
Portunus .....	51
Pinnotheridæ (Fam.) .....	51
Pinnotheres .....	51
Paguridæ (Fam.) .....	52
Pagurus .....	52
Porcellanadæ (Fam.) .....	52
Porcellana .....	52
Palæmonidæ (Fam.) .....	52
Pandalus .....	53
Palæmon .....	53
Penseadæ (Fam.) .....	53
Pasiphæa .....	53
Pleuroxus .....	54
Peracantha .....	54
Pæcilopoda (Legion) .....	55
Peltocephala (Tribe) .....	55
Pycnogonum .....	56
Stenorynchus .....	51
Siphonostoma (Ord.) .....	55
Talitrus .....	56



# INDEX.

## INSECTA.

	Page.		Page.
Anthocaris .....	57	Cleora .....	76
Argynnis .....	58	Coremia .....	77
Acherontia .....	60	Cheimatobia .....	76
Anthocera .....	60	Camptogramma .....	79
Arctia .....	60	Cabera .....	79
Apatela .....	63	Cnephasia .....	85
Acronycta .....	63	Clepsis .....	85
Apamea .....	65	Coccyx .....	87
Agrotis .....	67	Catoptria .....	88
Anthocelis .....	68	Cochylis .....	88
Aplecta .....	70	Chilo .....	89
Anarta .....	71	Crambus .....	89
Abrostola .....	72	Chimabacche .....	90
Aglossa .....	73	Carcina .....	93
Anisopteryx .....	76	Coleophora .....	95
Anaitis .....	77	Cemlostoma .....	96
Anticlea .....	78	Deilephila .....	99
Abraxas .....	79	Diloba .....	93
Acidalia .....	81	Diphthera .....	63
Amphysa .....	82	Dianthæcia .....	69
Argyrotoza .....	83	Dosithea .....	81
Aphelia .....	89	Dichelia .....	82
Achroea .....	90	Dictyopteryx .....	83
Anerastia .....	90	Ditula .....	84
Adela .....	91	Dicrorampha .....	87
Argyresthia .....	94	Depressaria .....	92
Achinia .....	92	Euchelia .....	60
Alucitina .....	98	Euthemonia .....	60
Ægeria .....	59	Eriogaster .....	61
Æchmia .....	94	Euperia .....	69
Bombyces (Fam.) .....	60	Epunda .....	70
Bryophila .....	64	Euplexia .....	71
Botys .....	73	Euclidia .....	72
Biston .....	76	Ebulea .....	73
Boarmia .....	76	Ellopia .....	74
Bradyopetis .....	80	Eurymene .....	75
Bactra .....	85	Epione .....	75
Batodes .....	86	Ennomos .....	75
Bucculatrix .....	97	Eubolia .....	77
Colias .....	57	Emmelesia .....	79
Chrysophanus .....	57	Ephyra .....	80
Chærocampa .....	59	Eupithecia .....	80
Clysiocampa .....	61	Ephippiphora .....	86
Cossus .....	62	Eupacilia .....	89
Cilix .....	62	Eudorea .....	89
Cerura .....	62	Ephestia .....	90
Ceropacha .....	63	Elachista .....	96
Caradrina .....	64	Fidonia .....	75
Crymodes .....	65	Grammesia .....	64
Cerigo .....	66	Gortyna .....	64
Chersotis .....	67	Glæa .....	69
Cerapteryx .....	68	Geometre (Fam.) .....	74
Chariptera .....	69	Geometra .....	74
Calocampa .....	71	Gnophos .....	77
Cucullia .....	71	Grapholita .....	86
Catacola .....	72	Gelechia .....	93
Chlorochroma .....	74	Glyphipteryx .....	91
Crocallis .....	75	Gracillaria .....	95

# INDEX.

	Page.		Page.
Heterocera .....	59	Ochsenheimeria .....	91
Hepialus .....	62	Ecophora .....	92
Hydræcia .....	65	Orthotælia .....	92
Heliophobus .....	68	Ornix .....	95
Hadena .....	70	Ochnerostoma .....	95
Heliothis .....	71	Ecophora .....	92
Heliodes .....	71	Pieris .....	57
Hydrocampa .....	73	Polyommatus .....	58
Hyppena .....	74	Pamphila .....	59
Hypenodes .....	74	Phragmatobia .....	60
Hemithea .....	74	Pœcilocampa .....	61
Himera .....	75	Platypteryx .....	62
Halia .....	75	Petasia .....	62
Hibernia .....	76	Pygœra .....	63
Hemerophila .....	76	Polia .....	70
Harpalyce .....	78	Phlogophora .....	70
Hyria .....	81	Plusia .....	71
Halias .....	81	Philopyra .....	72
Hypermezia .....	86	Phytometra .....	70
Homœosoma .....	90	Pyræles (Fam.) .....	72
Hyponomeuta .....	92	Pyrausta .....	72
Lepidoptera (Ord.) .....	57	Pyrælis .....	73
Lithosia .....	60	Pionea .....	73
Liparis .....	61	Polypogon .....	74
Lasiocampa .....	61	Phigalia .....	76
Leucania .....	64	Phasiane .....	77
Lupernia .....	65	Phæsyte .....	78
Lozogramma .....	77	Phibalapteryx .....	79
Leptogramma .....	82	Pœcilphasia .....	81
Lyonetia .....	96	Peronea .....	82
Lithocolletis .....	97	Ptycholoma .....	83
Melitæa .....	58	Penthina .....	84
Macroglossa .....	59	Pardia .....	84
Miana .....	65	Phoxapteryx .....	85
Miselia .....	69	Phlæodes .....	86
Mania .....	72	Pœdisca .....	86
Metrocampa .....	74	Pyrodes .....	88
Mæsia .....	75	Pampelia .....	90
Macaria .....	75	Plutella .....	91
Melanippe .....	79	Phyllocnistis .....	96
Mixodia .....	85	Pterophorus .....	97
Micropteryx .....	91	Rhopalocera (Fam.) .....	57
Nudaria .....	60	Rusina .....	66
Notodonta .....	62	Rhodaria .....	72
Nonagria .....	64	Rumia .....	74
Noctua .....	63	Retinia .....	87
Noctua .....	66	Röslerstammia .....	94
Nænia .....	72	Satyrus .....	58
Nola .....	74	Steropes .....	58
Numeria .....	75	Sesia .....	59
Nyssia .....	76	Sphinges (Fam.) .....	59
Natocelia .....	84	Sphinx .....	59
Nematapogon .....	91	Smerinthus .....	60
Nepticula .....	97	Saturnia .....	62
Orygia .....	61	Semaphora .....	63
Odonestis .....	61	Segetia .....	66
Orthosia .....	68	Spælotis .....	67
Ourapteryx .....	74	Scoliopteryx .....	69
Odontopera .....	75	Scopelosoma .....	69
Orthotenia .....	85	Scopula .....	73
Olinda .....	87	Spilodes .....	73

# INDEX.

	Page.		Page.
Stenopteryx .....	73	Thera .....	77
Strenia .....	81	Triphosa .....	79
Spilonota .....	84	Timandra .....	81
Sideria .....	84	Tortrices (Fam.) .....	81
Sericoris .....	84	Tortrix .....	82
Sciaphila .....	85	Teras .....	83
Sphaleroptera .....	85	Trycheris .....	88
Stigmonota .....	87	Tortricodes .....	89
Simæthis .....	88	Tineadæ .....	89
Semioscopis .....	90	Talceoporia .....	90
Steganolophia .....	78	Tinea .....	90
Thecla .....	57	Tischeria .....	97
Thanaos .....	59	Vanessa .....	38
Trochilium .....	59	Xylophasia .....	66
Triphæna .....	66	Xanthia .....	69
Trachea .....	68	Xylocampa .....	71
Tæniocampa .....	68	Xanthosetia .....	68
Tethea .....	69	Ysipetes .....	78
Thyatira .....	71	Zerene .....	79

## MYRIOPODA.

Armadillium Vulgare .....	111	Julus Terestris .....	111
Craspedosma Polydesmoidea .....	111	Lithobius Variegatus .....	111
Geophilus Subterraneus .....	111	Oniscus Murarius .....	111
Geophilus Electricus .....	111	Polydesmus Complanatus .....	111
Glomeris Marginata .....	111		

## ANNELIDES.

	Page.		Page.
Amphitrite .....	98	Nephele .....	99
Aphrodita .....	98	Ophelia .....	99
Arenicola .....	98	Pontobdella .....	99
Borlasia .....	98	Polynoe .....	99
Clepsine .....	99	Phyllodoce .....	99
Hæmopsis .....	99	Planaria .....	99
Lumbricus .....	99	Sabellaria .....	98
Myriandrida .....	99	Syllis .....	99
Nais .....	98	Spirorbis .....	99
Nereis .....	98	Serpula .....	100
Nemertes .....	98	Terelella .....	98
Nephtys .....	99	Vermilia .....	100

## ACALEPHÆ.

	Page.		Page.
Aurelia .....	100	Noctiluca .....	101
Beroë .....	101	Oceanidæ (Fam.) .....	100
Cyanæa .....	100	Pulmograda (Ord.) .....	100
Ciliograda (Ord.) .....	101	Rhizostoma .....	100
Cydlippe .....	101	Steganophthalmata (Ord.) .....	101
Discophoræ (Ord.) .....	100	Sarsiadæ (Fam.) .....	100
Gymnophthalmata (Ord.) .....	101	Sarsia .....	100
Geryoniadæ (Fam.) .....	100	Turris .....	100
Lizzia .....	101	Thaumantias .....	100

# INDEX.

## ECHINODERMATA.

	Page.		Page.
Asteriadae (Ord.)	102	Ophiurae (Fam.)	101
Amphidotus	102	Ophiura	101
Ciradites (Fam.)	102	Ophiocoma	101
Clypeasteriae (Fam.)	102	Pentactae (Fam.)	103
Cucumaria	103	Solasteriae (Fam.)	102
Echinidae (Ord.)	102	Solaster	102
Echinus	102	Spatangaceae (Fam.)	102
Echinocyamus	102	Urasteriae (Fam.)	102
Holothuriadae (Ord.)	103	Uraster	102
Ophiuridae (Ord.)	101		

## ZOOPHYTES.

	Page.		Page.
Anthozoa Hydroida (Ord.)	103	Geryoniadae (Fam.)	101
Antennularia	104	Gemellaria	107
Anthozoa Asteroidea (Ord.)	105	Hydractinia	103
Aleyonidae (Fam.)	105	Halecium	103
Aleyonium	105	Hydrina (Ord.)	105
Anthozoa Helianthoida (Ord.)	105	Hydridae (Fam.)	105
Actinina (Fam.)	105	Hydra	105
Actinia	105	Halcyonellea (Ord.)	108
Aleyonidium	108	Laomedeia	105
Bowerbankia	109	Membranipora	107
Corynidae (Fam.)	103	Polyzoa Infundibulata (Ord.)	107
Clava	103	Polyzoa Hyppocrepia (Ord.)	109
Coryne	103	Plumularia	104
Campanulariadae (Fam.)	105	Sertularina (Ord.)	103
Campanularia	105	Sertulariadae (Fam.)	103
Cristiadae (Fam.)	107	Sertularia	104
Crisia	107	Salicornaria	108
Celleporina (Ord.)	107	Serialara	108
Celleporidae (Fam.)	107	Tubularina (Ord.)	103
Cellepora	107	Tubulariadae (Fam.)	103
Cellularia	107	Tubularia	103
Cyclonm	108	Thuiaria	104
Cristatellidae (Fam.)	109	Tubuliporina (Fam.)	107
Cristatella	109	Tubulipora	107
Eudendrium	108	Vesicularina (Ord.)	108
Eucratiadae (Fam.)	107	Vesiculariadae (Fam.)	108
Escharidae (Fam.)	107	Vesicularia	108
Flustra	108	Valkeria	109

## SPONGIA.

	Page.		Page.
Amorphozoa (Fam.)	109	Halichondria	109

# INDEX OF ENGLISH NAMES OF THE ORDERS, FAMILIES, AND GENERA.

## MAMMALIA.

	Page.		Page.
Ass .....	8	Mouse, Common .....	7
Bat, Common .....	5	Mouse, Short-tailed field; or field Vole .....	8
Bat, Daubenton's .....	5	Noctule .....	5
Bat, Long-eared .....	5	Otter .....	6
Bat, Lesser Horse-shoe .....	5	Ox .....	8
Badger .....	6	Porpoise .....	9
Bottle-head .....	9	Rat, Black .....	7
Cat .....	7	Rat, Norway; or Brown .....	7
Dog .....	7	Rat, Water; or Water-vole .....	8
Dormouse .....	7	Rabbit .....	8
Fox .....	7	Shrew, Common .....	6
Guinea Pig; or Cavy .....	8	Shrew, Water .....	6
Goat .....	8	Shrew, Oared .....	6
Hedge-hog; or Urchin .....	6	Seal, or Sea-calf .....	7
Hare .....	8	Squirrel .....	7
Hog .....	8	Sheep .....	8
Horse .....	8	Vole, Bank .....	8
Mole; or Moldwarp .....	6	Weasel, Common .....	6
Marten .....	7	Weasel, Ermine; or Stoat .....	6
Mouse, Harvest .....	7	Weasel, Fitchet; or Polecat .....	6
Mouse, Long-tailed field .....	7	Weasel, Ferret .....	6

## BIRDS.

	Page.		Page.
Accentor; or Hedge Sparrow .....	12	Chough; or Red-legged Crow .....	15
Auk, Little; or Common Rotche .....	22	Crow, Carrion .....	15
Buzzard, Common .....	10	Crow, Hooded or Royston .....	15
Buzzard, Rough-legged .....	10	Creeper .....	16
Buzzard, Honey .....	10	Cuckoo .....	16
Blackbird .....	11	Curlew .....	18
Bunting, Snow .....	14	Curlew, Sandpiper or Pigmy .....	19
Bunting, Common .....	14	Corn Crane, or Land Rail .....	19
Bunting, Black-headed .....	14	Crake, Spotted .....	19
Bunting, Yellow; or Yellow Ammer .....	14	Crake, Little; or Olivaceous Gallinule .....	19
Bullfinch .....	14	Coot .....	20
Bittern, Little .....	18	Cormorant .....	22
Bittern, Common .....	18	Cormorant, Green or Shag .....	22
Chiff Chaff .....	12	Dove, Ring; Wood Pigeon; or Cushat .....	17
Chaffinch .....	14		
Crossbill, Common .....	15		

# INDEX.

	Page.
Dove, Turtle .....	17
Dotterell .....	17
Dunlin .....	19
Duck, Pintail .....	21
Duck, Eider .....	21
Duck, Wild .....	21
Duck, Ferruginous; or White-eyed .....	21
Duck, Scaup .....	21
Duck, Tufted .....	21
Diver, Northern .....	22
Diver, Red-throated .....	22
Erne, or Sea Eagle .....	10
Falcon, Peregrine .....	10
Flycatcher, Spotted .....	11
Field-fare .....	11
Greenfinch; or Green Grosbeak .....	14
Goldfinch .....	14
Grouse, Black .....	17
Grouse, Red .....	17
Greenshank .....	19
Godwit, Bar-tailed .....	19
Goose, Bean .....	20
Goose, Pink-footed .....	20
Goose, Bernicle .....	20
Goose, Brent .....	20
Golden Eye .....	21
Goosander .....	21
Grebe, Great-crested .....	21
Grebe, Eared .....	22
Grebe, Little; or Dabchick .....	22
Guillemot .....	22
Gannet; or Soland Goose .....	22
Gull, Little .....	23
Gull, Black-headed .....	23
Gull, Kittiwake .....	23
Gull, Common .....	23
Gull, Lesser Black-backed .....	23
Gull, Herring .....	23
Gull, Great Black-backed .....	23
Hawk, Sparrow .....	10
Hobby .....	10
Harrier, Marsh .....	10
Harrier, Hen .....	10
Harrier, Montague's .....	10
Hoopoe .....	16
Heron, Common .....	18
Heron, Night .....	18
Jackdaw .....	15
Jay .....	15
Kestrel; or Windhover .....	10
Kingfisher .....	16
Knot .....	19
Linnets .....	14
Lapwing; or Peewit .....	18
Mountain; or Bramble Finch .....	14
Merlin .....	10
Magpie .....	15
Martin .....	16
Martin, Sand or Bank .....	16
Moor Hen; or Water Hen .....	20
Merganser, Red-breasted .....	21

	Page.
Night-jar; or Goat Sucker .....	17
Osprey; or Fishing Hawk .....	10
Owl, Long-eared .....	11
Owl, Shot-eared .....	11
Owl, White or Barn .....	11
Owl, Tawny .....	11
Ouzel, Ring .....	11
Oyster-catcher; or Sea-pie .....	18
Pipit, Tree .....	13
Pipit, Meadow .....	13
Pipit, Rock .....	13
Pipit, Richard's .....	13
Pastor, Rose-coloured .....	15
Pheasant .....	17
Partridge .....	17
Plover, Great or Norfolk .....	17
Plover, Ringed .....	17
Plover, Grey .....	18
Phalarope, Grey .....	20
Phalarope, Red-necked .....	20
Pochard; or Dunbird .....	21
Puffin .....	22
Petrel, Fulmar .....	23
Petrel, Forked-tailed .....	23
Petrel, Storm .....	23
Quail .....	17
Redwing .....	11
Redbreast .....	12
Redstart .....	12
Redstart, Black .....	12
Regulus, Golden-crested .....	12
Redpole, Lesser or Common .....	14
Raven .....	15
Rook .....	15
Roller .....	16
Redshank, Common .....	18
Ruff .....	19
Rail, Water .....	20
Razor-bill .....	22
Shrike, Great grey .....	11
Shrike, Red-backed .....	11
Stonechat .....	12
Skylark .....	13
Sparrow, Tree .....	14
Sparrow, House .....	14
Siakin; or Aberdivine .....	14
Starling .....	15
Swallow .....	16
Swift, Common .....	16
Swift, Alpine .....	16
Sanderling .....	18
Sandpiper, Green .....	18
Sandpiper, Wood .....	18
Sandpiper, Common .....	19
Sandpiper, Spotted .....	19
Sandpiper, Buff-breasted .....	19
Snipe, Great .....	19
Snipe, Common .....	19
Snipe, Jack .....	19
Stint, Little .....	19
Swan, Whistling; or Hooper .....	20

# INDEX.

	Page.
Swan, Mute .....	20
Sheldrake; or Burrow Duck .....	20
Shoveler; or Broad-bill .....	20
Scoter .....	21
Smew .....	21
Skua, Common .....	23
Skua, Pomerine .....	23
Skua, Richardson's .....	23
Thrush, Missel .....	11
Thrush, Song .....	11
Tit, Great .....	13
Tit, Blue .....	13
Tit, Cole .....	13
Tit, Marsh .....	13
Tit, Long-tailed .....	13
Turnstone .....	18
Teal .....	21
Teal, Garganey .....	21
Tern, Sandwich .....	22
Tern, Common; or Sea Swallow .....	22
Tern, Lesser .....	23
Tern, Black .....	23

	Page.
Whinchat .....	12
Wheatear .....	12
Warbler, Grasshopper .....	12
Warbler, Sedge .....	12
Whitethroat, Common .....	12
Whitethroat, Lesser .....	12
Warbler, Wood .....	12
Warbler, Willow .....	12
Waxwing .....	13
Wagtail, Pied .....	13
Wagtail, Grey .....	13
Wagtail, Yellow or Ray's .....	13
Woodlark .....	13
Woodpecker, Green .....	15
Woodpecker, Great Spotted .....	15
Woodpecker, Lesser Spotted .....	15
Wryneck .....	16
Wren .....	16
Whimbrel .....	18
Woodcock .....	19
Wigeon .....	21

## REPTILES.

	Page.
Blind, or Slow Worm .....	24
Frog .....	24
Lizard, Sand .....	24
Lizard, Viviparous or Common .....	24
Newt, Common Warty or Great } Water .....	25

	Page.
Newt, Common Smooth .....	25
Newt, Palmated Smooth .....	25
Snake, Common or Ringed .....	24
Toad, Common; or Paddock .....	24
Toad, Natter-jack .....	24
Viper; or Adder .....	20

## FISHES.

	Page.
Anchovy .....	29
Anglesey Morris .....	32
Angel-fish; or Monk Fish .....	33
Bergylt; or Norway Haddock .....	26
Bream, Sea .....	26
Bream; or Carp Bream .....	28
Bream, White .....	28
Bib; Pout; or Whiting Pout .....	30
Burbot .....	30
Bret .....	31
Bloch's Topknot .....	31
Cottus, Long-spined; or Father } Lasher .....	26
Cottus, Short-spined .....	110
Carp .....	27
Carp, Gold .....	27
Chub .....	28
Cod .....	30
Cod, Power or Poor .....	30
Conger .....	32
Dory .....	26
Dragonet, Gemmeous .....	27
Dragonet, Sordid .....	110
Dace; Dare; or Dart .....	28
Dab, Common .....	31

	Page.
Dab, Lemon or Smooth .....	31
Dab, Long Rough .....	31
Dog Fish, Small Spotted .....	32
Dog Fish, Picked .....	33
Eel, Sharp Nosed .....	32
Eel, Broad Nosed .....	32
Eel, Sand; or Hornels .....	32
Fishing Frog; Angler; or Sea Devil .....	27
Flounder Flock .....	31
Gurnard, Cuckoo or Red .....	26
Gurnard, Sapphirine .....	26
Gurnard, Grey .....	26
Gunnell, Spotted; or Butter Fish .....	27
Goby, Black; or Rock .....	27
Goby, Spotted .....	27
Golden Maid; or Gilt Head .....	27
Goldsinny, Jago's .....	27
Gudgeon .....	28
Graining .....	28
Garfish; or Mackerel Guide .....	29
Grayling .....	29
Herring .....	29
Haddock .....	30
Hake .....	30
Holibut .....	31

# INDEX.

	Page.		Page.
Loach; Loche; or Beardie .....	29	Stickleback, Smooth-tailed .....	26
Ling .....	30	Stickleback, Ten-spined .....	26
Lamprey .....	34	Stickleback, Fifteen-spined .....	26
Lampern; or River Lamprey .....	34	Salmon .....	29
Miller's Thumb; or River Bullhead .....	26	Salmon Trout .....	29
Mackerel .....	26	Smelt; or Sparling .....	29
Mullet, Grey .....	27	Sprat .....	29
Mullet, Thick-lipped .....	110	Sole, Smooth; or Scaldfish .....	31
Minnow .....	29	Sole .....	31
Opah, or King-fish .....	27	Sole, Variegated .....	31
Perch .....	25	Sucker, Lump .....	31
Perch, Sea; or Basse .....	25	Sucker, Unctuous; or Sea Snail .....	31
Pogge, or Armed Bullhead .....	26	Sand-launce; or Riggle .....	32
Pike; Jack; or Luce .....	29	Sturgeon .....	32
Pollack .....	30	Skate; or Blue Skate .....	33
Plaice .....	30	Sandpride .....	110
Pipe Fish, Great .....	32	Tench .....	28
Pipe Fish, Equoreal .....	32	Trout .....	29
Ruffe, or Pope .....	25	Turbot .....	31
Roach .....	28	Tope, Common .....	33
Red-eye, or Rudd .....	28	Torpedo, New British .....	33
Roach, Blue; or Azurine .....	28	Thornback .....	33
Rockling, Three-bearded .....	30	Weever, Greater; or Stingbull .....	25
Rockling, Five-bearded .....	30	Weever, Lesser; Otter Pike; or } Sting-fish .....	25
Ray, Bordered .....	33	Whiting .....	30
Ray, Homelyn or Spotted .....	33	Whiff .....	31
Ray, Sting; Trygon; or Fire-flaire .....	33		
Stickleback, Rough-tailed .....	26		

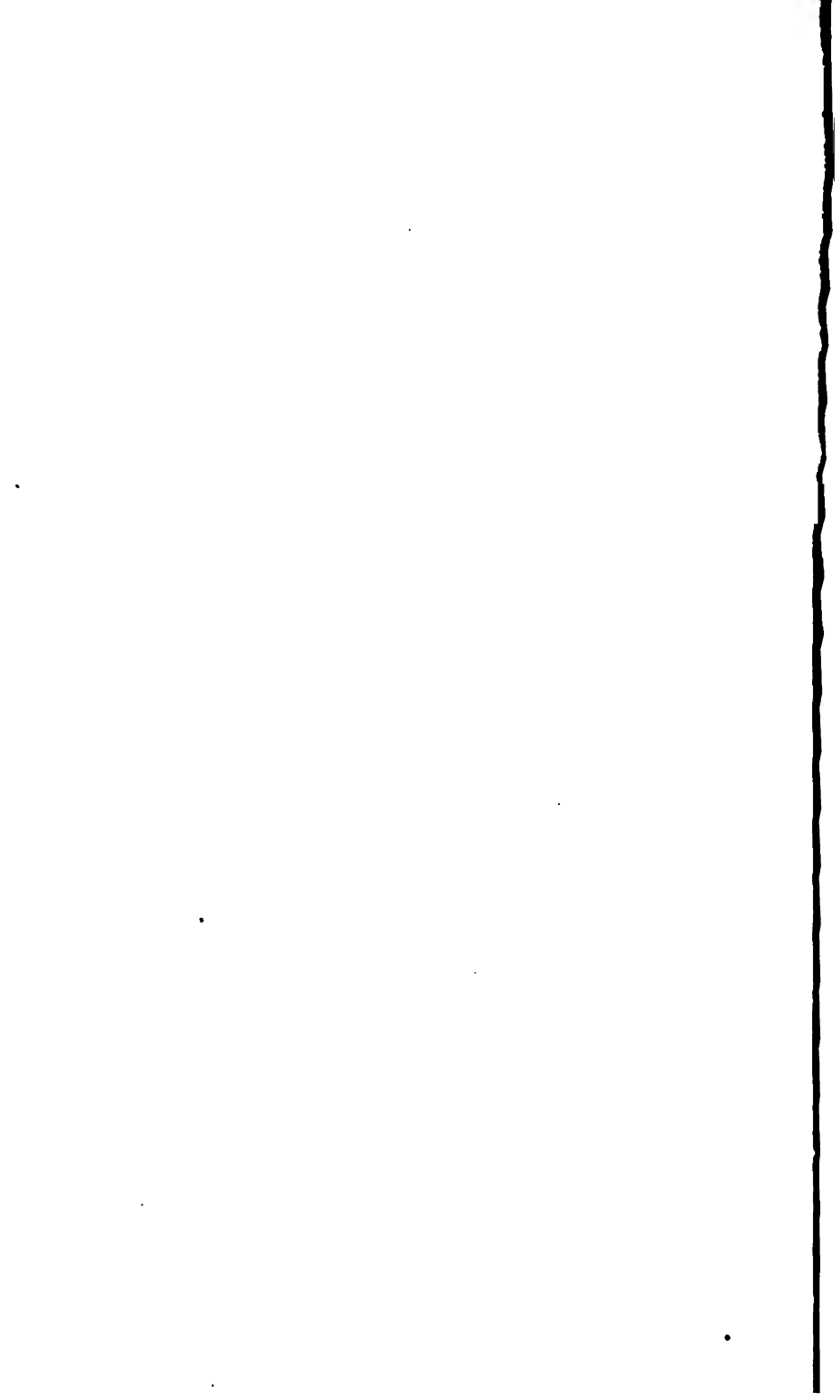
## ECHINODERMATA.

	Page.		Page.
Brittle-star, Gray .....	101	Sand-star, Lesser .....	101
Brittle-star, Common .....	102	Sun-star .....	102
Cross Fish .....	102	Urchin, Common Egg .....	102
Cucumber, Sea .....	103	Urchin, Green Pea .....	102
Sand-star, Common .....	101	Urchin, Common Heart .....	102









PROCEEDINGS  
OF THE  
LIVERPOOL  
LITERARY & PHILOSOPHICAL SOCIETY,  
DURING THE  
FORTY-FOURTH SESSION,  
1854—55.  
No. IX.



LIVERPOOL:  
PRINTED FOR THE MEMBERS OF THE SOCIETY.

378

**NOTE.—The Authors only are responsible for the sentiments.**

**LIVERPOOL:**  
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# LIST OF MEMBERS

AT THE  
CLOSE OF THE SESSION XLIV.—1854-55.

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JOHN THOMAS TOWSON.

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## ORDINARY MEMBERS.

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### Elected.

1833 Aikin, James, 1, *Goree-piazas, and 1, Alfred-street.*

1851 Anderson, Robert Worrall, 23, *Falkner-square.*

1841 Anderson, Thomas Francis, 3, *Cable-street, and Holly-lodge, Fairfield.*

1854 Andrew, John, 20, *Fenwick-street, and Sandown-park, Wavertree.*

1844 Archer, Francis, M.R.C.S.E., Corresp. Mem. Nat. Hist. SS. Boston  
and Belfast, 49, *Rodney-street.*

1853 Archer, Thomas Croxon, Lect. on Botany Liverp. Sch. of Medicine,  
*Revenue-buildings, and Higher Transmere.*

1854 Aspinall, John Bridge, Barrister-at-law, 1, *South John-street, and 47,  
Bedford-street South.*

1854 Atkin, George, 60, *Cable-street, and Falkner-street.*

1854 Bahr, George W., 4, *Cable-street, and South-hill Grove, Aigburth.*

1834 Baines, Thomas, *Castle-street, and Oakfield, Little Woolton.*

1853 Baldey, Alexander, *Baltic-buildings, Redcross-street.*

1854 Banister, Rev. W., B.A., *Mount Cemetery, Upper Duke-street.*

1851 Bean, William, *Revenue-buildings, and 91, Wellington-road.*

1850 Behrend, Henry, M.R.C.S.E., 15, *Canning-street.*

IV.

Elected.

- 1854 Bennett, William, 109, *Shaw-street*.  
 1812 Bickersteth, Robert, Hon. F.R.C.S.E., Cons. Surg. Liverp. Royal Infirmary, 2, *Rodney-street*.  
 1848 Bishop, Rev. Francis, 7, *High Park-street*.  
 1847 Bloxam, Fred. William, 16, *West Derby-street*.  
 1834 Boulton, Francis, Jun., 5, *Union-court, Castle-street, and Clifton-park*.  
 1835 Boulton, Swinton, 37, *Castle-street, and 3, Bedford-street South*.  
 1854 Bretherton, Edward, 49, *North John-street, and 47, Hamilton-square, Birkenhead*.  
 1852 Brewer, John, Barrister-at-Law, 1, *South John-street*.  
 1844 Bright, Samuel, 1, *North John-street, and Sandheys, Mill-lane, West Derby*.  
 1855 Brockholes, James Fitzherbert, 7, *Egerton-street, Birkenhead*.  
 1851 Brougham, James Rigg, Barrister-at-Law, Reg. Court of Bankr., 14a, *South John-street*.  
 1849 Burke, William, *Revenue-buildings, and 36, Percy-street*.  
 1848 Byerley, Isaac, F.L.S., M.R.C.S.E., *Myrtle Cottage, Seacombe, Cheshire*.  
 1855 Byrom, William, 18, *Nelson-street*.  
 1848 Casey, George, *Naylor-street, and Elmfield, Walton*.  
 1851 Clare, John Leigh, 11, *Exchange-buildings, and 11, Richmond-terrace, Breck-road*.  
 1844 Clay, Robert, 38, *Saint Anne-street*.  
 1853 Cohen, Douglas, M.D., 16, *Hardy-street*.  
 1850 Cox, Henry, 15, *Exchange-alley North, and Spring-bank, Walton-breck*.  
 1844 Dale, Robert Norris, 12, *Exchange-street East, and 1, Richmond-terrace, Breck-road*.  
 1845 Davis, George Millett, M.R.C.S.E., Surgeon Northern Hospital, 78, *Rodney-street*.  
 1848 De Finance, Gabriel, 39, *North Bedford-street*.  
 1840 Dickinson, Joseph, M.A. and M.D. Trin. Coll. Dub. and Cantab., M.R.C.P.L., F.R.S., M.R.I.A., F.L.S., F.B.S.E., Phys. to Liverpool Royal Infirmary, 5, *Nelson-street*.  
 1848 Dove, Percy Matthew, F.S.S., 1, *North John-street, and 49, Hamilton-square, Birkenhead*.  
 1847 Driffield, Walter Wren, *York-buildings, Sweeting-street, and Prescott*.  
 1848 Drysdale, John James, M.D. Edin., L.R.C.S.E., 44, *Rodney-street*.  
 1836 Duncan, William Henry, M.D. Edin., Medical Officer of Health, 2, *Cornwallis-street, and 17, Peel-terrace, Falkner-square*.  
 1833 Eden, Thomas, M.R.C.S.E., 105, *Park-road, (Dingle-hill)*.  
 1848 Edwards, John Baker, Ph.D. Gies., F.C.S., 42, *Berry-street, and 7, Church-street, Birkenhead*.  
 1844 Ellison, King, M.R.C.S.E., 30, *Rodney-street*.  
 1850 Evans, Henry Sugden, F.C.S., 52a, *Hanover-street*.  
 1846 Faram, John, 8, *Railway-cottages, Edge-hill*.  
 1852 Ferguson, William, F.L.S., F.G.S., 18, *Royal Exchange, London*.  
 1855 Finlayson, Alexander, 6, *New Quay*.  
 1852 Fischel, Rev. A., 4, *Great George-square*.  
 1849 Fisher, William M'Naught, Ph.D., F.R.A.S., 39, *Great George-street*.  
 1837 Fletcher, Edward, 3, *India-buildings*.  
 1854 Fletcher, Fred. D., M.R.C.S.E., 1, *Mornington-terrace*.  
 1855 Foard, J. F., 34, *Church-street*.  
 1849 Forshaw, John, 6, *Sweeting-street, and 4, Grove-park, Lodge-lane*.  
 1854 Gee, Robert, M.D., M.R.C.S.E., 10, *Oxford-street*.

## Elected.

- 1853 Godden, Joseph, M.R.C.S.E., *Oxton, Cheshire.*  
 1844 Gray, Thomas, 1, *North John-street*, and 9, *Northumberland-terrace, Everton.*  
 1853 Greenwood, Henry, 16, *Canning-place*, and 12, *Fairfield Crescent, Prospect Vale, Fairfield.*  
 1854 Griffiths, Rev. Henry, 3, *Montpelier-terrace, Upper Parliament-street.*  
 1855 Hakes, James, M.R.C.S.E., Surg. North. Hosp., 12, *Maryland-street.*  
 1850 Hamilton, George, 1, *Wellington-road, North Egremont.*  
 1847 Hampton, Rev. H., M.A., 18, *Upper Parliament-street.*  
 1837 Hartley, John Bernard, *Coburg Dock, and Mosley-hill.*  
 1850 Hartnup, John, F.R.A.S., *Liverpool Observatory, Waterloo Dock.*  
 1841 Heath, Edward, *Orange-court, Castle-street*, and *St. Domingo-grove*, 10, *Breckfield-road, Everton.*  
 1850 Hibbert, Thomas Dorning, Barrister-at-Law, 39, *Sackville-street*, and *Middle Temple, London.*  
 1846 Higgins, Rev. H. H., M.A. Cantab., F.C.P.S., *Rainhill.*  
 1836 Higginson, Alfred, M.R.C.S.E., 44, *Upper Parliament-street.*  
 1850 Hodson, Thomas Llewellyn, M.R.C.S.E., 39, *Islington.*  
 1854 Holland, Charles, 17, *Tower-buildings North*, and *Liscard Vale, Egremont.*  
 1852 Holt, Alfred, 1, *India-buildings*, and 2, *Rake-lane, Edge-hill.*  
 1849 Holt, George, Jun., *Fenwick-chambers*, and 2, *Rake-lane, Edge-hill.*  
 1847 Horner, Henry P., *Basnett-street*, and 7, *Everton-road.*  
 1850 Howson, Rev. John Saul, M.A. Trin. Col. Cantab., Principal of the Collegiate Institution, 4, *South Hill-street.*  
 1847 Huggins, Samuel, 35, *South John-street*, and 17, *Brunswick-road.*  
 1841 Hume, Rev. Abraham, D.C.L. Dub., LL.D. Glasg., F.S.A., M.P.S., Corresp. F.S.A. Scot., 9, *Clarence-street, Everton.*  
 1851 Hunt, George, *Handsworth, near Birmingham.*  
 1854 Hunter, John, 12, *Exchange-street East*, and 2, *Mersey-view, Seacombe.*  
 1851 Hutchinson, Richard, M.R.C.S.E., *Upper Stanhope-street.*  
 1850 Ihne, William, Ph.D. Bonn, 6, *Carlton-terrace, Upper Parliament-street.*  
 1844 Inman, Thomas, M.D. Lond., M.R.C.S.E., F.B.S.E., Lect. on Princip. and Pract. of Med. Liverp. Sch. of Med., Phys. to Northern Hosp., 16, *Rodney-street.*  
 1854 Jones, John, 34, *Chapel-street*, and 55, *Rodney-street.*  
 1852 Jones, Morris Charles, 3, *Harrington-street*, and 75, *Shaw-street.*  
 1851 Jones, Roger Lyon, *Great George-square.*  
 1853 Keates, John, 28, *King-street*, and 8, *Huskiesson-street.*  
 1855 King, Alfred, *Newington*, and 1, *Netherfield-road South.*  
 1846 King, Joseph, Jun., 3, *Union-court*, and 59, *Shaw-street.*  
 1854 Kirwan, Chas., M.R.C.S.E., 1, *Upper Parliament-street.*  
 1848 Lamport, William James, *Fenwick-chambers*, and 5, *Beech-terrace, Fairfield.*  
 1839 Lassell, William, F.R.S., F.R.A.S., 20, *Milton-street*, and *Broadstones, Sandfield Park, West Derby.*  
 1852 Lassell, William, Jun., 20, *Milton-street.*  
 1844 Lear, John, 1, *North John-street*, and 11, *Holland-terrace, Edgehill.*  
 1854 Lidderdale, William, 42, *Canning-street.*  
 1844 Lord, William, Lieut. R.N., *Revenue-buildings*, and 16, *Sandon-street.*  
 1834 M'Andrew, Robert, F.R.S., F.L.S., 84, *Upper Parliament-street*, and *Allhallows Chambers, Lombard-street, London.*



## Elected.

- 1854 McIlveen, Alexander, Princip. Mech. Inst., 9, *Sandon-terrace*.  
 1852 Macleod, Norman, Practical Examiner of Masters and Mates, *Sailors' Home*, and 8, *Peel-street*.  
 1853 McNicholl, Thos., 32, *Crown-street*.  
 1853 Marrat, Frederick Price, 15, *White Mill-street*.  
 1848 Marshall, Buchanan, M.D.Glasgow, 29, *Islington-terrace*.  
 1839 Martin, Studley, *Exchange-chambers*, and 3, *Chesterfield-street*.  
 1844 Mayer, Joseph, F.S.A., F.R.As.S., F.E.S., &c., 68, *Lord-street*.  
 1854 Melly, George, 7, *Water-street*, and 5, *Bedford-street South*.  
 1854 Millward, Charles, 2, *Franklin-terrace*, *Whitfield-road*, *Everton*.  
 1853 Milner, Rev. J. W., M.A., 1, *Devonshire-terrace*, *Upper Parliament-street*.  
 1854 Mitchell, Thomas R., M.D., 166, *Duke-street*.  
 1855 Morton, George H., 5, *London-road*.  
 1849 Moss, Rev. John James, B.A., *Otterspool*, and *Acton*, *Nantwich*.  
 1850 Mott, Albert Julius, *South Castle-street*, and 41, *Prospect-vale*, *Fairfield*.  
 1854 Mott, Charles Grey, 9, *Exchange-alley North*.  
  
 1834 Neill, Hugh, L.R.C.S.E., F.R.A.S., 115, *Mount-pleasant*.  
 1851 Newlands, James, Borough Engineer, 2, *Cornwallis-street*, and 2, *Clare-terrace*, *Duke-street North*, *Edge-hill*.  
 1847 Nisbet, William, L.Fac.P. and S.G., *Church-street*, *Egremont*.  
  
 1853 Pearse, W. H., M.D., 1, *Upper Parliament-street*.  
 1846 Picton, James Allanson, F.S.A., 19, *Clayton-square*, and *Sandy-knowe*, *Wavertree*.  
 1853 Porter, Rev. James, M.A. Fell. St. Pet. Cantab., *Collegiate Institution*.  
 1854 Potts, Frederick, *Chester*.  
 1854 Prange, F., 12, *Dale-street*, and 2, *Grove Park*, *Lodge-lane*.  
  
 1854 Puckle, George Hall, M.A. St. John's Cantab., *Windermere*.  
 1850 Ramsay, Rev. Arthur, M.A. Trin. Coll. Cantab., *Hayman's Green*, *West Derby*.  
 1844 Ramsay, Peter, M.D.St.And., F.R.C.P.E., M.R.C.S.E., Surg. R.N., 69, *Chatham-street*.  
 1812 Rathbone, Richard, 24, *Water-street*, and *Woodcote*, *Aigburth-road*.  
 1812 Rathbone, William, 24, *Water-street*, and *Greenbank*, *Wavertree*.  
 1851 Redish, Joseph Carter, 16A, *Fenwick-street*.  
 1854 Rees, William, 2, *West Derby-street*.  
 1854 Rigge, Thomas, 1, *Union-court*, *Castle-street*, and 64, *Rodney-street*.  
 1840 Robberds, Rev. John, B.A., 4, *High-park-street*, *Toxteth-park*.  
 1854 Roberts, John, 53, *Hope-street*.  
 1853 Rowe, James, 2, *Chapel-walks*, and *Eaton Cottage*, *Woolton-road*, *Wavertree*.  
 1850 Ryder, James O., 1, *Fenwick-street*, and 39, *Fallner-square*.  
  
 1836 Salt, Charles Frederick, 88, *Upper Canning-street*.  
 1845 Sansom, Thomas, A.L.S., *Revenue-buildings*, and 7, *Everton-road*.  
 1846 Scholfield, Henry Daniel, M.D.Oxon, M.R.C.S.E., 14, *Hamilton-square*, *Birkenhead*.  
 1853 Shain, James Miller, M.R.C.S.E., 4, *Monument-place*, *London-road*.  
 1854 Slack, Henry W., M.R.C.S.E., 111, *Dale-street*.  
 1812 Smith, James Houlbrooke, 28, *Rodney-street*, and *Green-hill*, *Allerton*.  
 1848 Smith, John Peter George, *Borough Bank*, *Water-street*, and *Spring-bank*, 47, *Breck-road*, *Everton*.  
 1853 Sommers, John Augustus, M.R.C.S.E., 17, *Hunter-street*.  
  
 1855 Taylor, John Stopford, M.D.Aberd., M.R.C.S.E., 23, *Springfield*.

## Elected.

- 1842 Taylor, Robert Hibbert, M.D.Edin., L.R.C.S.E., F.B.S.E., Lect. on Ophthalm. Med. Liverp. Sch. of Med., *Percy-street*.  
 1854 Thompson, Samuel Henry, *Thingwall-hall, Knotty Ash*.  
 1849 Thomson, David Purdie, M.D.Edin., L.R.C.S.E., 4, *Salisbury-street*.  
 1812 Thornely, Thomas, M.P., 8, *Mount-street*.  
 1844 Thornely, Francis, 9, *Exchange-alley*, and 16, *Hope-street*.  
 1851 Towson, John Thomas, Scient. Examiner of Masters and Mates, *Sailors' Home*, and 33, *Great George-square*.  
 1844 Turnbull, James, M.D.Edin., Phys. Liverp. Roy. Infirm., 4, *Mornington-terrace*.  
 1844 Vose, James Richard White, M.D.Edin., Sen. Phys. Liverp. Roy. Infirm., 5, *Gambier-terrace*.  
 1844 Walmsley, Joshua, 50, *Lord-street*.  
 1849 Watling, John William Henry, M.R.C.S.E., *Wavertree*.  
 1844 Winstanley, Samuel, *Church-street*, and 2, *Gambier-terrace*.  
 1855 Wybergh, John, jun., Clerk to Magistrates, *Sessions-house*, and *Church-road, Seaforth*.  
 1836 Yaniewicz, Felix, 60, *Mount-pleasant*.  
 1812 Yates, Joseph Brooks, F.S.A., M.R.G.S., M.P.S., 25, *King-street*, and *West Dingle*.  
 1834 Yates, Richard Vaughan, 31, *Brunswick-street*, and *The Shrubbery, Aigburth-road*.

*Note.*—The proposals of the following Gentlemen lie before the Society: Messrs. Alfred North, Joseph Goodwin, W. W. Rundell, W. G. Wilks, and Daniel M'Kinlay.

## CORRESPONDING MEMBERS.

## Elected.

- 1812 Peter Mark Roget, M.D.Edin., F.R.C.P., F.R.S., F.G.S., F.R.A.S., F.R.G.S., &c., *London*.  
 1813 Very Rev. William Buckland, D.D.Oxon., F.R.S., F.L.S., F.G.S., F.R.G.S., Hon. F.C.P.S., Dean of Westminster, *Deanery, Westminster*.  
 1816 George Cumming, M.D.Edin., L.R.C.P., *Denbigh*.  
 1819 John Stanley, M.D.Edin., *Whitehaven*.  
 1819 and 1825 Rev. W. Scoresby, D.D., F.R.S.S.L. and E., Member of the Institute of France, of the American Institute, Philadelphia, &c.  
 1820 Joseph Carne, F.R.S., M.R.I.A., F.G.S., &c., *Penzance, Cornwall*.  
 1828 Rev. Brook Aspland, *Duckinfield, Cheshire*.  
 — John Ashton Yates, M.R.G.S., *Bryanston-square, London*.  
 1833 Thomas Stewart Traill, M.D.Edin., F.R.C.P.E., F.R.S.E., F.G.S., &c., *Edinburgh University*.  
 1833 The Right Hon. the Earl of Harrowby, P.C., D.C.L., F.R.S., *Sandon-hall, Staffordshire*, and 39, *Grosvenor-square, London*.  
 1833 James Yates, M.A., F.R.S., F.L.S., F.G.S., &c., *Lauderdale-house, Highgate, London*.  
 1835 George Patten, A.R.A., *London*.

## Elected.

- 1835 William Ewart, M.P., *Cambridge-square, Hyde-park, London.*  
 1835 Lord Brougham and Vaux, M.A., F.R.S., &c., &c., &c.  
 1835 The Right Hon. the Earl of Ellesmere, D.C.L., F.R.S., F.G.S., F.L.S., F.S.A., &c., *Worsley Hall, Lancashire, and 18, Belgrave-square, London.*  
 1836 Chevalier de Kirkhoff, *Antwerp.*  
 1837 The Right Hon. the Earl of Burlington, M.A., LL.D., F.R.S., M.R.I.A., F.G.S., F.R.G.S., F.C.P.S., F.Z.S., &c., *Belgrave-square, London.*  
 1838 Professor Airey, M.A., D.C.L., F.R.S., Hon. F.R.S.E., Hon. M.R.I.A., F.R.A.S., F.C.P.S., &c., Astronomer Royal, *Greenwich.*  
 1840 James Naysmith, *Patricroft.*  
 1840 Richard Duncan Macintosh, L.R.C.P., *Exeter, Devonshire.*  
 1841 Charles Bryce, M.D.Glasg., Fell. F.P. and S.Glasg., Socio dell' Accad. de Lin. Roma., *Ludlow.*  
 1844 J. Beete Jukes, M.A., F.R.S., M.R.I.A., F.G.S., Local Director of the Geological Survey of Ireland, *Dublin.*  
 1844 T. B. Hall, *London.*  
 1844 Peter Rylands, *Warrington.*  
 1844 John Scouler, M.D., LL.D., F.L.S., Prof. Nat. Hist. Dublin Royal Society.  
 1844 Thomas Rymer Jones, F.R.S., F.Z.S., F.L.S., M.R.C.S.E., &c., *King's College, London.*  
 1844 Robert Patterson, *Belfast.*  
 1844 Signor L. Bellardi, *Turin.*  
 1844 Signor Michelotti, *Turin.*  
 1844 Thomas Bell Salter, M.D.Edin., M.R.C.S.Eng. and Edin., F.L.S., F.B.S.E., *Ryde, Isle of Wight.*  
 1844 Professor Alger, *Boston, U.S.*  
 1844 Sir Charles Lemon, Bart., M.A.Cantab., F.R.S., F.G.S., *Cardex, Cornwall.*  
 1844 Il Cavaliere Carlo Passerini, *Pisa.*  
 1844 William Carpenter, M.D.Edin., M.R.C.S.E., F.R.S. F.G.S., *London University.*  
 1846 Rev. Baden Powell, M.A.Oxon., F.R.S. F.R.A.S., F.G.S., &c., *Oxford University.*  
 1847 Sir William Rowan Hamilton, LL.D., Hon. F.R.S.E., M.R.I.A., F.R.A.S., F.C.P.S., &c., Astronomer Royal of Ireland, *Dublin.*  
 1849 Thomas Nuttall, F.L.S., *Rainhill, Lancashire.*  
 1849 Rev. Thomas Corser, M.A., *Stand, Bury.*  
 1850 Rev. St. Vincent Beechey, M.A.Cantab., *Worsley, near Eccles.*  
 1851 James Smith, F.R.S.S.L. and E., F.G.S., &c., *Jordan-hill, Glasgow.*  
 1851 Henry Clarke Pidgeon, *Putney College, and 30, Upper Montague-street, Montague-square, London.*  
 1851 Rev. Robert Bickersteth Mayor, M.A.Cantab., Fell. St. John's Coll. Cantab., F.C.P.S., *Rugby.*  
 1851 George Johnston, M.D.Edin., LL.D.Aberd., F.R.C.S.E., &c., *Bervick-upon-Tweed.*  
 1852 Thomas Spencer, *London.*  
 1852 William Reynolds, M.D., *Coed-du, Denbighshire.*  
 1853 Rev. James Booth, LL.D., F.R.S., &c., *Wandsworth, Surrey.*

# PROCEEDINGS.

## ANNUAL MEETING,

HELD AT THE ROYAL INSTITUTION, OCTOBER 16, 1854.

JOSEPH DICKINSON, M.D., F.R.S., &c., PRESIDENT, in the Chair.

The Annual Report (*vide* p. 2) was unanimously adopted.

The Treasurer's accounts were passed.

The new Council and Office-bearers were balloted for—the Rev. H. H. Higgins, M.A., Rev. John Robberds, B.A., John B. Edwards, Ph.D., John Brewer, Esq., Barrister at Law, and Thomas C. Archer, Esq., being recommended by the retiring Council,—and the following gentlemen were elected\* :—

### *President.*

JOSEPH DICKINSON, Esq., M.A., M.D., F.R.S., F.L.S., &c.

### *Vice-Presidents.*

JOSEPH BROOKS YATES, Esq., F.S.A., &c. &c.

ROBERT McANDREW, Esq., F.R.S., F.L.S.

THOMAS INMAN, Esq., M.D., F.B.S.E.

### *Treasurer.*

JOHN P. GEORGE SMITH, Esq., Banker.

### *Hon. Secretary.*

DAVID P. THOMSON, Esq., M.D.

### *Other Members of Council.*

JOHN HARTNUP, ESQ., F.R.A.S.

WILLIAM IHNE, ESQ., PH.D.

JOHN T. TOWSON, ESQ., SEC. LOCAL  
MARINE BOARD.

ISAAC BYERLEY, ESQ., F.L.S.

REV. JOHN ROBBERDS, B.A.

REV. H. H. HIGGINS, M.A., F.C.P.S.

THOMAS C. ARCHER, ESQ.

J. B. EDWARDS, ESQ., PH.D.

JOHN BREWER, ESQ., BARRISTER-  
AT-LAW.

\* During the Session the following changes took place :—Isaac Byerley, Esq., appointed Treasurer, *vice* J. P. G. Smith, Esq.; William Ihne, Esq., Ph.D., appointed Vice-President, *vice* Thomas Inman, Esq., M.D., retired from the Council; Swinton Boalt, Esq., elected by the Council in the room of Dr. Inman.

## ANNUAL REPORT OF THE RETIRING COUNCIL.

In surrendering into the hands of the members the trust reposed in them, the Council congratulate the Society on the progressive advancement it has made during its forty-third Session.

During the past Session the following gentlemen have been added to the list of Ordinary Members, viz.:—Messrs. A. Baldey, J. A. Sommers, J. M. Shain, H. Greenwood, H. H. Pearse, M.D., T. C. Archer, Rev. J. Porter, B.A., T. McNicholl, Joseph Godden, J. Keates, J. Jones, W. Bennett, W. Rees, W. Lidderdale, R. Gee, M.D., F. D. Fletcher, F. Prange, Rev. W. Banister, B.A., George Melley, J. Rigge, G. W. Bahr, J. B. Aspinall, C. G. Mott, and C. Kirwan; and to the list of Corresponding Members, the Rev. James Booth, L.L.D., F.R.S., &c., late President of this Society, has been added.

The Council, with great regret, report the removal by death of Mr. W. B. Falcon, Mr. H. Thorpe, and Mr. J. Focke; also Mr. Charles Barber, President of the Liverpool Academy, a gentleman who, during a connection of nearly thirty years with this Society, gained alike the respect of its members by his consistent and able support of its objects, and their warm regard, by the many virtues of his personal character.

Resignations have been received from Messrs. J. Grimaldi, J. M. Banner, James Dowie, T. Reay, R. Lowndes, C. C. Chambers, Edward Higgin, Edward Banner, T. Avison, Robert Shute, Joseph Boulton, and R. G. Williams.

The names of Messrs. James Harvey, Edward Kemp, and George Padley, have been removed from the list of members under the operation of the second law.

The Society now numbers 204 members—137 ordinary, and 67 corresponding.

The following Papers have been read during the Session, many of which will appear in full in the forthcoming volume of Proceedings, namely:—

“The Geographical Distribution of Testaceous Mollusca in the North-east Atlantic and Neighbouring Seas,” by R. McAndrew, Esq., F.R.S., F.L.S., V.P.,

“The most marked Development of the Arts promoted by War,” by Joseph Boulton, Esq.

“On Great Circle Sailing,” by J. T. Towson, Esq.

“On English Dialects,” by the Rev. Dr. Hume,

“Critique on the ‘Paradise Lost’ of Milton,” by W. Ihne, Ph.D.

"On the Raised Beaches of the Frith of Clyde," by W. Ferguson, Esq. F.L.S., F.G.S., &c.

"On the Minor Poets of the Day," by F. W. Bloxam, Esq.

"On the Life and Writings of the Dutch Poet, Joost Van Vondel," by the Rev. A. Fischel.

"On Heraldry," by the Rev Dr. Hume.

"On the Life and Philosophy of Hobbes," by the Rev. A. Ramsay.

"On the Torbane Hill Mineral," by the Rev. J. J. Moss, B.A.

"The Attraction of Ellipsoids considered Geometrically," by Matthew Collins, B.A.

Donations to the Library have been received from the Royal Astronomical Society, Historic Society of Lancashire and Cheshire, Linnean Society, Royal Society of Edinburgh, Botanical Society of London, W. Stevenson, Esq., Rev. Dr. Hume, Rev. Dr. Thom, and Professor Edward Forbes.

The Council, in order to render the new volume of Proceedings as acceptable to the members as possible, have appended to it a very valuable "*Fauna of Liverpool*," by Isaac Byerley, Esq., F.L.S., &c., read before the Society in May, 1852. The printing of this Fauna was postponed for reasons stated in the last volume of Proceedings. In bringing this work before the Society they feel sure it will be received as a valuable addition to our knowledge of natural history, not only in this neighbourhood but throughout the country.

The Council having duly considered the subject of the subscriptions, are of opinion, that in order to maintain the efficiency of the Society the subscription of one guinea, voted at the last annual meeting, should be permanently continued.

The Council regret that the proposed union of the several Learned Societies of Liverpool with the Literary and Philosophical Society has proved to be impossible; as the Architectural and Archæological, and the Polytechnic Societies declined to entertain the proposal, and the Historic Society of Lancashire and Cheshire was unwilling to comply with the condition laid down by this Society, of adopting the old name of Literary and Philosophical Society, as the name of the proposed united Society.

The Council congratulate the Society upon the recent visit to Liverpool of the British Association for the Advancement of Science; and they feel sure that this meeting will contribute to give an impulse to renewed and increased exertions on the part of the members of this Society.



## EXTRAORDINARY MEETING.

ROYAL INSTITUTION.—October 30, 1854.

JOSEPH DICKINSON, M.D., F.R.S., PRESIDENT, in the Chair.

The following resolution was carried,\* by 13 to 10 :—

“The Council having duly considered the subject of the subscription, are of opinion, that in order to maintain the efficiency of the Society, the subscription of One Guinea, voted at the last Annual Meeting (October, 1853), should be permanently continued.”

Before going to the vote, the following recommendation of the Council was read :—

“That if the Annual Subscription be raised to One Guinea, it be optional with the present members to compound as Life Members, for Five Guineas; and for all future members, for Ten Guineas, including the entrance fee.”

## SECOND ORDINARY MEETING.

ROYAL INSTITUTION.—October 30th, 1854.

JOSEPH DICKINSON, M.D., F.R.S., &amp;c., PRESIDENT, in the Chair.

Mr. Isaac Byerley was elected Treasurer, vice Mr. J. P. G. Smith.

The Council communicated that the following resolution had been by them unanimously adopted :—“That in order to carry out more efficiently the objects of the society, there be constituted from the Council three committees, viz.:—one for Literature and the Fine Arts; one for Natural Philosophy and Science; and one for Natural History, including Geology and Ethnology: and that the following

\* This was not subsequently confirmed; and the recommendation of the Council not being a substantive motion was not put.



members, together with the President, Treasurer and Secretary, who are *ex officio* members of all committees, be placed upon these committees, with power to add to their number\* :—

“A.—*Literature and the Fine Arts* :

J. B. Yates, Esq., Dr. Ihne, Rev. Mr. Robberds, and J. Brewer, Esq.

“B.—*Natural Philosophy and Science* :

Mr. Towson, Mr. J. P. G. Smith, Mr. Hartnup, and Dr. Edwards.

“C.—*Natural History, including Geology and Ethnology* :

Mr. McAndrew, F.R.S., Dr. Inman, Rev. Mr. Higgins, and Mr. T. C. Archer.”

The Council also communicated that the following resolution had been unanimously adopted,—“That the compass guidance of iron ships having been brought prominently forward, it is very desirable to appoint a committee to further the investigation and report, as suggested by the British Association for the advancement of Science, at their late meeting; and that the following gentlemen, members of this Society, be appointed members of such committee, with power to add to their number, and to solicit the co-operation of the Polytechnic Society,† the Underwriters’ Association and others, viz. :—Joseph Brooks Yates, Esq., F.S.A., David P. Thomson, M.D., John T. Towson, Esq., John Hartnup, Esq., F.R.A.S., J. B. Edwards, Ph.D., James Newlands, Esq., John Jones, Esq., Swinton Boulton, Esq., George Hamilton, Esq., and Norman McLeod, Esq.

Mr. W. Jevons resigned his membership.

Mr. Sansom received the thanks of the Society for having edited the eighth volume of Proceedings.

The preliminary business being closed with the communication of thanks from the various Societies which had been invited to this meeting, the President vacated the Chair and the members adjourned to the large lecture room.

\* As filled up by the Council, and with the officers elected in committee, these committees are as follows .—

A.—J. B. Yates, Esq., *Chairman*; Dr. Dickinson, Mr. Byerley, Dr. Thomson, Dr. Ihne, Rev. Mr. Robberds, Rev. Mr. Ramsay, Mr. Henry Behrend; and Mr. Brewer, *Secretary*.

B.—Mr. Swinton Boulton, *Chairman*; Dr. Dickinson, Mr. Byerley, Dr. Thomson, Mr. Towson, Mr. J. P. G. Smith, Mr. Hartnup, Dr. Duncan, Mr. Salt, Mr. G. Hamilton; and Dr. Edwards, *Secretary*.

C.—Rev. H. H. Higgins, M.A., *Chairman*; Dr. Dickinson, Mr. McAndrew, F.R.S., Dr. Inman, Mr. Byerley, Dr. Thomson, Mr. F. Archer, Mr. A. Higginson, Mr. E. Bretherton, Mr. Marratt; and Mr. T. C. Archer, *Secretary*.

† The Polytechnic Society cordially responded to this resolution, as also did the Underwriters’, Shipowners’, and Steam-Ship Associations; and, with the addition of other names, was formed the influential committee which is presently engaged in the enquiry.

William Rathbone, Esq., was asked to preside, but he declined in favour of Thomas Stewart Traill, Esq., M.D., F.R.S.E., who took the Chair.

The Rev. W. Scoresby, D.D., F.R.S.S.L. & E., &c., &c., addressed the meeting, "*On Magnetism and the Compass-guidance of Iron Ships.*"

### EXTRAORDINARY MEETING.

ROYAL INSTITUTION.—November 18th, 1854.

JOSEPH DICKINSON, M.D., F.R.S., &c., PRESIDENT, in the Chair.

It was moved that the resolution of the Extraordinary Meeting of the 30th October, relative to the permanent increase of the annual subscription, be confirmed.

An Amendment to the following effect was moved by the Rev. ABRAHAM HUME, LL.D., seconded by Mr. BURKE,—

"That the annual subscription of all future members of the Society, and of as many of the existing members as think proper, be one guinea; and that any member may compound for life membership by paying ten such subscriptions in one sum, which sum (in the case of new members) shall include the entrance fee." It was lost by 14 to 10.

The original motion was not confirmed.

### THIRD ORDINARY MEETING.

ROYAL INSTITUTION.—November 13, 1854.

JOSEPH BROOKS YATES, Esq., SENIOR V.P., in the Chair.

Dr. Macrorie resigned his membership.

Charles Holland, Esq., John Hunter, Esq., and Edward Bretherton, Esq., were balloted for, and duly elected members of the Society.

The Rev. Mr. ROBBERS exhibited, in illustration of the state of art at various times between the 14th and 16th centuries, the *Palaeographia Sacra* of Westwood; and Mr. YATES described the *Liber Aureus*, which he had lately examined at Treves.

The first part of a Paper, "*On the Resources of Russia*,"\* by Wilhelm Ihne, Ph.D., was communicated to the Society.

#### FOURTH ORDINARY MEETING.

ROYAL INSTITUTION.—November 27, 1854.

JOSEPH DICKINSON, M.D., F.R.S., &c., PRESIDENT, in the Chair.

Henry Slack, Esq., M.R.C.S.E., was duly elected a member.

The PRESIDENT alluded to the death of Professor Edward Forbes, a corresponding member, which had filled the scientific world with the utmost sorrow.

Mr. MARRAT exhibited a new moss from Bidston Marsh, thought to be the *Hypnum Salibrosum*.

The concluding part of Dr. Ihne's Paper, "*On the Resources of Russia*,"\* was communicated to the Society.

#### FIFTH ORDINARY MEETING.

ROYAL INSTITUTION.—December 11th, 1854.

JOSEPH DICKINSON, M.D., F.R.S., PRESIDENT, in the Chair.

The following gentlemen were balloted for, and duly elected Ordinary Members:—SAMUEL H. THOMPSON, Esq., ALEX. M'ILVEEN, Esq., THOMAS R. MITCHELL, Esq., M.D., CHARLES MILLWARD, Esq., GEORGE H. PUCKLE, Esq., M.A., the Rev. HENRY GRIFFITHS, and JOHN ANDREW, Esq.

\* It is to be regretted that owing to the author's long continued and severe illness during the Session, together with the fact that the paper was not written out when delivered, no part of it can be given.

The SECRETARY read to the Society a document which had been "served personally" upon him by the Rev. ABRAHAM HUME, LL.D., D.C.L., and laid before the Council.\*

Mr. BYERLEY exhibited a coloured drawing of the *Antiopa Hyalina*, found at Hilbre Island, and a fine specimen of the *Nephrops Norvegicus*, taken in the Dee.

Mr. A. HIGGINSON exhibited a fine specimen of the *Moschus Javanicus*, also a piece of packing paper made from the *Triticum Repens*.

Mr. T. GRAY exhibited several valuable specimens of Australian

\* The following is a copy of the Reverend Doctor's "Notice," and the Council's reply:—  
 "Literary and Philosophical Society.      "To the Secretary of the Literary and Philosophical Society of Liverpool.

**NOTICE.**

"To the Council in General,  
 and to the Treasurer and  
 Secretary in particular.

"Rev. A. HUME, LL.D.

"25th November, 1861.

"Served personally by

SIR,—I have been credibly informed that it is the intention of the Council of the Literary and Philosophical Society to send to the members, along with the volume entitled '*Proceedings of the Literary and Philosophical Society of Liverpool*,' during the Forty-third Session, 1853–54, a volume which forms no part of said proceedings, viz., a private book on the Fauna of Liverpool, compiled and edited by Isaac Byerley, Esq. I have also been credibly informed that the said private book is not a donation to the society, but that, on the contrary, the Council have resolved to pay for its production out of the funds of the Literary and Philosophical Society which remained at the close of Session 1853–4, and out of such other monies as the Society may procure this session. I, therefore, being a member of the said Society, and acting as the nature of the case requires, as well as under suitable advice, do hereby issue through you the following Notice to the several parties concerned; that is to say:—

"To the Council in General.

"1. That the Society only authorised them to print papers actually read, or abstracts of them.

"2. That they are not authorised to print even the '*Proceedings*' at intervals of more than one year.

"3. That no appeal has been made to the Society for any extraordinary expenditure of funds according to the laws of the Society, in reference to the said Fauna of Liverpool.

"4. That if any private book whatsoever be issued by the Council without such authority, the act is a direct violation of the trust which they have voluntarily accepted, and is also a violation of the Act of Parliament 17 and 18 Victoria, cap. 112.

"To the Treasurer.

"1. That any payment whatever made on account of the said book will be made at his personal risk and peril.

"2. That Mr. Byerley himself, who had a personal and pecuniary interest in the matter, was present at the meeting of Council at which this act was resolved upon, his presence being necessary to constitute a quorum.

"To the Secretary.

"1. That I, and other members of the Society whose sentiments I here represent, require him to deliver to us the *Proceedings* of the Society, No. VIII., without any such addition, or

"2. That in case he fail to do so, our acceptance of any additional printed matter,

gold, with a large quantity of gems, sapphires, rubies, &c., taken from the washings at the Buckworth Diggings, near the "Ovens;" likewise some leguminous plants from "the Bush."

A paper was read to the Society by the Rev Mr. ROBBERDS, B.A., "*On the Personal Character and Scientific Labours of the late Dr. Dalton.*"

## SIXTH ORDINARY MEETING.

ROYAL INSTITUTION.—January 8th, 1855.

JOSEPH DICKINSON, M.D., F.R.S., &c., PRESIDENT, in the Chair.

Mr. H. CAUTY resigned his membership.

JOHN ROBERTS, Esq., JAMES FITZHERBERT BROCKHOLES, Esq., and GEORGE MORTON, Esq., were balloted for, and duly elected Members of the Society.

Dr. IHNE was elected Vice-President, in the room of Dr. INMAN, who had retired from the Council.

Mr. KEATES exhibited, chiefly to draw attention to the wood-cuts, an Italian translation of Agricola's work on the metals. Its date was 1563.

without our wish, and contrary to our directions, will in no respect implicate us in this transaction, nor be a bar to any such proceedings as may hereafter be taken in the matter.

"A. HUME.

"9, Clarence-street, Everton,  
25th November, 1854.

"Witness to Signature, RICHARD R. MOORE, 6, Clarence-street, Everton."

(REPLY.)

"Liverpool Literary and Philosophical Society,  
Royal Institution, Dec. 1, 1854.

"To the Rev. A. HUME, LL.D.

"SIR,—I am requested to forward to you the following extract from the minutes of proceedings of the Council of this Society of the 30th ult.

Your obedient servant,

"DAVID P. THOMSON, Hon. Sec.

"RESOLVED UNANIMOUSLY,—That the Council of the Literary and Philosophical Society having received and considered Dr. Hume's communication, have in reply to state, that they believe they have acted in strict conformity with the regulations of the Society in the publication of their eighth volume of proceedings in its present form."

Mr. YATES exhibited the rare "Musæum Tradescantianum," by John Tradescant, 1656; and entered into an explanation of the collection enumerated, noticing many curious things in it. He also referred to the recent renovation of the monument erected in the churchyard of Lambeth.

Mr. GRAY exhibited several drawings illustrating punishments in China.

Mr. HUNTER drew attention to Seechi's Observations on Terrestrial Magnetism, and gave a short sketch of the laws laid down by that celebrated astronomer.

Dr. THOMSON referred to the late observations of Struve on the contracting of Saturn's rings upon the body of the planet, and to observations made about a century ago; also to Seechi's reference to the drawing made by Campani in 1664.

A communication was made to the Society by Dr. INMAN, "*On Spontaneous Combustion, and Suggestions for Extinguishing Fire.*"

This paper was subsequently published by the author.

## SEVENTH ORDINARY MEETING.

ROYAL INSTITUTION.—January 22nd, 1855.

JOSEPH BROOKS YATES, Esq., SEN. V.P., in the Chair.

The Council was requested to revise the list of Corresponding Members, and submit a corrected list to the Society.

The following gentlemen were balloted for, and duly elected Ordinary Members:—GEORGE ATKIN, Esq., JAMES HAKES, Esq., and A. FINLAYSON, Esq.

The CHAIRMAN read several extracts from "broad sheets" printed in 1702, entitled, "Characters of the Royal Family, Ministers of State, &c., in the French Court, written by a French nobleman to his friend in England."

Mr. J. Jones exhibited a curious specimen of Chinese paper bearing coloured designs, apparently woven like cloth, suitable for walls.

The following paper was then read :

# OBSERVATIONS ON THE PHENOMENON OF ODOUR,

By THOMAS C. ARCHER, Esq.

It is, I believe, generally supposed that all odoriferous bodies give off particles, which, coming in contact with the olfactory organs, communicate the sense of smell to the brain. This probably is the case in some instances, but I have been led to doubt it as a general fact. If the sensation of smell resulted from the absolute contact of atoms given off by the odorous substance, it would follow as a matter of course that such circumstances as would be likely to increase the evaporation or elimination of those particles would increase their power of producing the sensation of odour ; but I think I can prove that this is not always the case. For instance, many flowers are very much more fragrant when the atmosphere is moist, especially after rain, and thunder showers more particularly, circumstances which cannot be so favourable to the evolution of essential or volatile oils as hot sunshine would prove to be.

There are, too,

“ Flowers which wake when others sleep,”

and—

“ Timid jasmine buds that keep  
Their odours to themselves all day ;  
But when the sunlight dies away,  
Let the delicious secret out,  
To every wind that roams about.”

The words of the poet express the truth, for the fact of many flowers being odorous by night only is well known. The jessamine mentioned by the poet only possesses this quality partially, but the beautiful *Oenothera biennis* is scentless by day, and has an exquisite odour of primroses at night. No flower, however, is so remarkable in this respect as the night-flowering stock, *Matthiola trista*, which, previous to the dusk of evening, is perfectly inodorous, but afterwards becomes so powerfully fragrant, that a plant carried into a room becomes oppressively sweet. Many others might be cited, but these are sufficient to show that the odour of some plants increases when the temperature is lowered, and the fact that most plants are most fragrant after rain is too well known to require examples. Hence it follows that some plants are most fragrant upon a decrease of temperature, a condition always opposed to volatilization : and others are most fragrant when the

atmosphere is charged with moisture, a condition hostile to the ordinary hypothesis that the fragrance of plants is dependent upon the evolution of certain volatile oils, upon which the perfume depends, for the presence of water in the air is certainly calculated to prevent rather than accelerate the transmission of particles of oil. Again, if the perfume of plants depended upon the evolution of volatile atoms, that perfume would only exist as long as the life of the plant cells continued, or at all events its effect would be much diminished upon the death of the plant; such however, is not always the case,—the delicate rose, the pungent labiate plants, and a hundred others, retain their power of perfume after the death of the tissue which yields it; and strange to say, in some instances, as in the woodruff, (*Asperula odorata*), the perfume is only eliminated after death.

From these, and a multitude of instances of a similar kind, I am led to this conclusion:—*That the combination of oxygen with certain secretions of plants, leads, both in life and death, to a peculiar variety of cremacausis or oxidation, the effects of which are transmitted to the brain through the conducting medium of the air; and that a certain quantity of moisture in the air renders it a better conductor of this chemical action.*

But it will be said, we know that in some cases the result is solely attributable to the volatilization of essential oils. Witness the rinds of the various *Aurantiacæ*, the *Menthæ*, and other labiates, and a great variety of plants, the essential or volatile oils of which are procured in consequence of their odour. It is true that a substance may be smelled at a distance in consequence of its volatile particles being brought in contact with the olfactory organs, but this does not prove the absolute necessity of a constant elimination of atoms from odorous substances; it simply proves that some substances require to be nearer to the nose than others, in order that the sensation may be experienced. Perhaps I am not sufficiently clear upon this point, but let me compare the sense of taste with that of smell; it is not contended that any substance taken into the mouth is brought into absolute contact with the nerves of taste, but the sensation is communicated or conducted through the skin of the tongue, as that of feeling is also conducted by the skin of the fingers.

My theory is, that this power of conduction may also be extended to that portion of the atmosphere which intervenes between the plant cell and the olfactory membrane; or else that the intervening atmosphere itself undergoes an absolute chemical change by its contact with the active oxygenization going on in the plant cell; and this chemical change may be extended for a considerable space. In support of this



view I may also mention that many flowers and fruits, and especially also some animal products, have a totally different smell at different distances from the nose. Musk and civet are remarkable instances of this; they are very agreeable to some persons when in very slight quantities or at a distance, but to the same persons these perfumes are positively nauseous when too near, or in too large quantities. Another reason I may perhaps be allowed to advance is, that in the case of some plants it is absolutely necessary that the surrounding air must be perfectly still, or they become scentless, even though the only motion of the air be a current made by endeavouring to draw the perfume up the nose. This is particularly exemplified by the musk plant *Mimulus moschatus*, which it is well known has a beautifully delicate odour of musk, but if we attempt to smell it a second time we find it less perfumed, and after the third time we can perceive no odour whatever. I am of course supposing that this proceeding only occupied two or three minutes. I have still another argument to offer, and that is the remarkable fact that all the perfumes at present known may be referred to a very few types; thus the heliotrope may be taken as one type, and we find the meadow-sweet (*Spiraea ulmaria*), the hawthorn, the sweet scented coltsfoot, and many others closely resemble it. The violet may be taken as another type, and we find the root of the *Iris florentina* and a few other plants, especially some of the turpentine-producing conifers, also yield a similar odour. This would seem to imply a greater regularity of the action producing the sense of smell, than we can suppose would be caused by the radiation of atoms from so many different species.

In conclusion, I beg to remark that the most careful microscopic examination with the highest powers fail to detect the elimination of particles, although we can detect the motion of the contents of cells, and changes produced by oxygenization.

I am at present engaged in endeavouring to classify vegetable odours under well known types, and if I have the privilege at some future time of returning to this subject, I shall hope to have a large and satisfactory list of perfumes so arranged.

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## EIGHTH ORDINARY MEETING.

ROYAL INSTITUTION.—5th February, 1855.

ROBERT McANDREW, Esq., F.R.S., F.L.S., V.P., in the Chair.

The following Gentlemen were balloted for, and duly elected members:—JOHN WYBERGH, JUN. Esq., and F. POTTS, Esq., Chester.

Mr. MARRAT exhibited several rare mosses, one of them being new, from this neighbourhood.

A communication was made to the Society by J. T. TOWSON, Esq.,

### ON THE SOLAR RAY.

AFTER explaining the two theories of propulsion and undulation, he assumed, without adopting, the former. The solar ray had been divided into seven colours, but it was now believed there were only three primary ones—red, yellow, and blue. He explained the respective properties of the several colours, and their possession of light, heat, and actinism, which could be taken separately or collectively. He noticed the experiments which had been made to shew the varying effects of the several rays with reference to their means of imparting heat, as also with regard to their chemical properties. The latter he distinguished as positive, neutral, and negative; comparing their relative effects on each other to acid, water, and alkali; the middle ray being capable of diluting, but not of neutralising, either of the extremes, which, however, would neutralise each other. He applied these observations to photography, and explained the difference in photographic effects to arise from differences in the atmosphere, according to the time of day, the time of year, or the climate; the solar ray differing in its proportions of blue and red. He proceeded to show the influence of these several rays on the processes of vegetation, the blossoming of flowers, the ripening of fruits, &c., and concluded by remarking that such investigations tended to prove the infinite wisdom and goodness of the Almighty.

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## NINTH ORDINARY MEETING.

ROYAL INSTITUTION.—19th February, 1855.

JOSEPH DICKINSON, Esq., M.D., F.R.S., PRESIDENT, in the Chair.

The following gentlemen were balloted for, and duly elected members of the Society:—WILLIAM BYROM, Esq., J. S. TAYLOR, Esq., M.D., and ALFRED KING, Esq.

The PRESIDENT exhibited several medals recently struck by the Crystal Palace Company, of very elegant design and beautiful workmanship, presented to Mr. T. C. Archer.

The SECRETARY read a communication from Mr. James Boardman, on the compass of modern Rome, as estimated by him by walking measurement. His pace was at the rate of 3·5 miles an hour, and he completed the circuit of the walls in three hours forty-five minutes, showing the circumference to be 12·5 miles.

Bearing upon the subject of the paper for the evening, a large number of photographs on glass and paper, positives and negatives, were exhibited; and the following communication was made to the Society, and experimentally illustrated:

## ON PHOTOGRAPHY,

WITH SPECIAL REFERENCE TO THE CHEMICAL PRINCIPLES INVOLVED  
IN THE COLLODION AND PAPER PROCESSES.

By J. BAKER EDWARDS, Esq., Ph.D., F.C.S.

ALTHOUGH many ingenious processes have been devised for the production of photographic impressions, none have been equally satisfactory with those which depend for their success on *the reduction of silver from its salts*. This mainly is the principle involved in the daguerreotype, calotype, and collodion processes, although the metal is precipitated in modified and varied forms by each of these methods. The reduction is first induced by an occult change produced in the crystalline or chemical structure of the silver salt by the direct action of reflected light; this change is continued and accelerated by the use of chemical reducing agents, and is arrested by the application of a solvent for the undecomposed silver salts. The result is a thin veil of reduced metal, which may be obtained in various conditions or in

combination with other bodies by the adoption of different modes of reduction. In the main, however, and in general terms, these processes have but one object in view, and the chemical principles involved are analogous, although the results vary very much, both in appearance and in actual condition. They resemble, however, more or less the products which would be obtained by the action of the reducing agents under favourable circumstances upon the salts themselves, the portions acted upon by light having only anticipated, in point of time, the result which would follow over the whole surface were not the action arrested at the proper moment.

For example, in the daguerreotype process very finely divided iodide of silver is obtained by submitting a highly polished silver plate to the vapour of iodine. The light affects the structure of these crystals so that when submitted to the vapour of mercury, reduction and amalgamation takes place, which the undecomposed iodide restrains from spreading over the whole surface as would otherwise take place. Then by immersion in an alkaline solvent, such as the hyposulphite of soda, the iodide is removed and the silver beneath it exposed intact. This white amalgam is obtained in a crystalline form when mercury is suspended in a solution of nitrate or sulphate of silver, and is known as the "silver tree."

In the calotype process, paper is first saturated with iodide of potassium, then with nitrate of silver, washed and exposed to the light: the surface thus presented consists of iodide of silver, free nitrate of silver, and organic matter; the latter materially assisting in the reduction. The chemical agent employed to develop the image in this process is gallic acid, which throws down metallic silver from its solutions in the form of a black powder. In this state the silver is therefore reduced in intimate adhesion to the pores and surface of the paper. The undecomposed iodide is dissolved out as before, and the negative rendered more transparent by being saturated with wax. Among the processes on glass the albumen process most nearly assimilates to the calotype. Plates of glass being coated with albumen containing iodide of potassium, are dried, saturated with nitrate of silver, exposed to the light, then developed by gallic acid, and lastly, fixed by hyposulphite of soda. Thus the re-agents employed are the same as before, and effect the same purpose, but the organic matter is very different; of course we have all the advantage of additional translucency and great brilliancy of effect; but besides this we find the process greatly accelerated, and the tone of the result much modified. How shall we account for this except by referring to the nature of albumen as a highly complex organic com-

pound, readily decomposed, and containing phosphorus and sulphur, which elements, possessing as they do a high degree of affinity for silver, probably assume an important part in the decompositions which ensue.

In the collodion process the same salts of silver are employed, but gallic acid is no longer applicable as the developing agent: other substances are therefore resorted to, viz. pyrogallic acid, which reduces silver as a black powder,—or sulphate of iron, which precipitates it in a white crystalline condition; thus by the first agent we obtain the result required for negative impressions, and by the latter positive pictures of great delicacy and beauty. But will the substitution of these reducing agents for the gallic acid account for the extraordinary and disproportionate rapidity of the collodion process? Probably not. We must then seek for the solution of this problem in the nature of the *organic matter* subjected to these conditions; for the cause of dissimilarity is not apparent in the nature of the chemicals employed. Indeed the decomposition in all the silver processes is capable of a very general expression, as follows:—

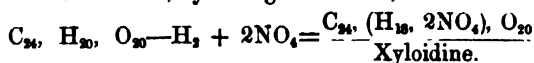
Salts of silver, as the iodide, bromide, chloride, &c., are partly reduced by light; further reduced, and the structure changed by developing agents, as mercury, gallic acid, pyrogallic acid, sulphate of iron, &c.; while the remaining salts of silver are dissolved in the fixing bath of hyposulphite of soda, or cyanide of potassium.

To the chemical constitution of albumen ( $C_{40}, H_{31}, N_8, O_{13}, PS_3$ ), reference has already been made; its composition is highly complex, and it is readily subject to decomposition. Pure paper, which is one of the forms of lignine ( $C_{24}, H_{20}, O_{20}$ ), is a much more simple and stable compound, and probably undergoes no decomposition during the photographic process; but the porous character of its texture affords a kind of mechanical force, called catalysis, which, as in the case of spongy platinum and burnt charcoal, assists in overcoming the resistance of chemical affinity, and thus contributes to the reduction of the metal. In this view of the case we might expect a less rapid though similar action from paper as that obtained from albumen. Pure lignine, however, is not to be obtained in the form of paper, and the starch or size employed in its manufacture (as well as extraneous substances introduced), causes considerable variation in the sensitiveness of the paper under different processes. Many modifications of the calotype have therefore been adopted, and their success depends in some measure on the choice of the paper most suitable to the particular process.

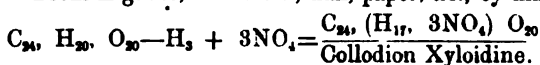
In the collodion process the character of the organic matter is yet more obviously changed. Collodion is a solution of gun cotton in alcoholised ether; and the gun cotton, so dissolved, may be prepared from several substances besides cotton, as flax, paper, sawdust, &c., all having the same chemical composition, and coming under the generic name of *lignine*. These substances, when acted upon by nitric acid, form a series of substitution compounds, which contain relatively two, three, or five equivalents of nitrous acid in the place of as many equivalents of hydrogen removed.

The decomposition may be thus represented :

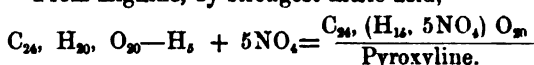
From Starch, by strong nitric acid,



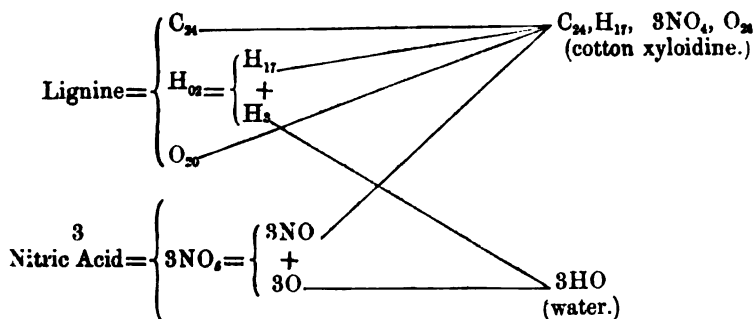
From Lignine, i.e. cotton, flax, paper, &c., by mixed acids,



From Lignine, by strongest nitric acid,



Or by the following diagram :—



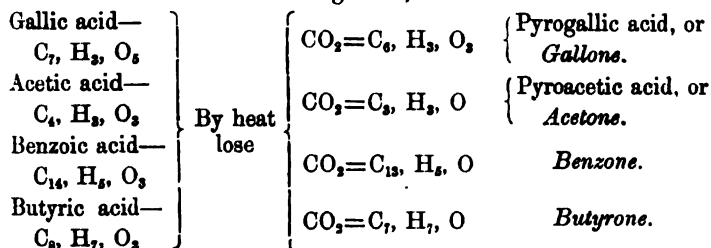
We thus see that gun paper or gun cotton contains nitrous acid, one of the most readily decomposed substances we know, equally ready to throw off 2 eqs. of oxygen, and be converted into  $NO_2$ , or on the other hand to absorb oxygen and form  $NO_4$ . We may judge then, *a priori*, that it is a substance very prone to decomposition. But we need not depend on supposition: we have the direct experiments of Dr. Gladstone to prove, that of these compounds the first is the most ready to decompose, which it does spontaneously, leaving a gummy mass, and yielding  $NO_4$  as gas. Still further, he finds that the second compound, the one we employ for collodion, also suffers spontaneous decomposition,

but especially if it be kept in the light, the result being similar to the foregoing. The third substance, pyroxyline, (explosive gun cotton), is much more stable, and does not decompose under ordinary conditions. These experiments I can confirm from my own observation; and, coupled with the fact that the sensitiveness in some measure varies with the solvent, we have ample grounds for assuming that the reactions involved depend largely on collodion itself as a reducing agent.

These considerations derive especial interest from the case of *Talbot v. Laroche*, recently decided in the Court of Common Pleas, in which the plaintiff sought to restrain the defendant from practising the collodion process, in virtue of his patent for the paper process. In this case, as in the celebrated "coal case," the scientific evidence was very conflicting, and high authorities held opposite opinions. None can read the account of this trial without feeling great interest in the course of the enquiry, and perceiving that great legal and scientific principles are involved in the decision; and although in the course of the trial these may appear at issue, the summing-up of Chief Justice Jervis on the case exhibits a remarkably clear, intelligent, and comprehensive view of the question, which in itself must be considered a difficult and obscure one. The claim in the patent of Mr. Fox Talbot, as limited by the Court, amounts only to the use of gallo-nitrate of silver as a sensitive agent, applied to paper previously prepared with iodide of silver, and the use of the same compound applied as a developing agent, and lastly, the use of a soluble bromide as a fixing agent. Under this construction the jury found for the defendant. The claim, however, advanced by the plaintiff under his patent, amounted to the general use of *salts of silver*, developed by *reducing agents* and fixed by *chemical solvents*, which of course would include every known efficient process. This claim is based upon the principle that "chemical equivalents are infringements of patents," and that the employment of any known chemical to effect the same result as that specified in the patent, would infringe the patent, by virtually using the same means, just as a mechanical equivalent of power is protected under a patent right. With this view it was argued that the collodion is a mechanical equivalent for the paper, and simply serves as a surface for the precipitation of the silver iodide; that pyrogalllic acid is allied to gallic, and both perform the same office in the reduction of silver; and that the choice of a solvent or fixing agent is comparatively unimportant: hence that the processes were identical in principle, and nearly related in practice. Against this view it may be urged, that considering the nature of collo-

dion, which does not consist of "dissolved paper" (as represented), but of a new substance, complex and unstable as we have already seen, it is more than probable that this substratum or base takes an active chemical part in the decompositions which ensue.

With respect to the developing agent, the attempt was made to assume that pyrogallic acid was a mere modification of gallic acid, that it was in fact gallic acid sublimed by heat, and exalted in properties. But the fact stands otherwise: the modification includes the loss of carbonic acid; and its properties as an acid are more than doubtful: nor are they intimated by the name, which refers rather to its origin than its properties, and simply means, "from gallic acid by fire." Now it is an analogous body to other substances obtained from organic acid; and I know not why its name should not conform to that analogy, in which case it would be called "gallone," thus:—



The chief difference, practically, between gallic and pyrogallic acids as reducing agents, is in time and energy—the reduction by the former being gradual, so that the intermediate stages of oxidation are gone through ere the reduction is complete; the latter at once reduces the metal as a black deposit. Pyrogallic acid is therefore quite inapplicable in lieu of gallic acid as a sensitive agent, and cannot be employed in Mr. Fox Talbot's process. But the process is by no means dependant on the use of pyrogallic acid, as known to most Liverpool photographers; reduction by strong iron solutions answering the same purpose; or weak iron solutions, the deposit being further strengthened by salts of gold, or mercury, or iodides, or sulphides of the alkalis, involving reactions and manipulations quite inapplicable to any paper process. The deposition of silver in a white granular condition by iron, forming positive images, is certainly a process beyond the provision of any paper patent; and the fixing agents now in use, are as certainly an advance in knowledge since the date of that specification. Hence my conclusion is, that while most photographic processes have one object in view, viz. the reduction of silver from its salts, and in pursuance of that object apply known principles of chemical science in the choice of reducing agents;



nevertheless, whether in principle, manipulation, agencies, or results, no two processes of the art can be found more widely independent of each other, or more strictly bound within their respective limits, than the Talbotype and the Collodion processes.

## TENTH ORDINARY MEETING.

ROYAL INSTITUTION.—March 5th, 1855.

JOSEPH DICKINSON, Esq., M.D., F.R.S., PRESIDENT, in the Chair.

A recommendation from the Council, that reporters be not admitted during private business, was unanimously adopted.

The corrected list of Corresponding Members was submitted and unanimously adopted.

Dr. EDWARDS exhibited several specimens of brazing by the electro-type process, and explained the method.

The late long-continued and severe frost having led many to an examination of thermometers, the Rev. Mr. Higgins, Dr. Dickinson, and Dr. Thomson, urged the necessity of having standard instruments more generally used, and correction tables applied, without which thermometrical returns were worthless.

Dr. DICKINSON exhibited several celts found in an Irish bog.

Mr. HUNTER exhibited a curious folio pamphlet of 1719, entitled "Truth is but truth as it is timed! or our Ministers' present measures against the Muscovites vindicated by plain and obvious reasons."

The CHAIRMAN read a letter which he had received from Mr. Hutchinson, Surgeon to the S.S. *Pleiad*, giving some interesting details respecting the exploring expedition.

That vessel had penetrated into the country more than 250 miles beyond the limits of former expeditions; and it was found that the Binuë, flowing through the rich kingdoms of Adamau and Kororoofa, and crossed by Dr. Barth, was the parent of the Tshadda, which flows into the Niger, and forms a confluence at Adda-kuda. The crew, consisting of 66 men, 12 of them being Europeans, enjoyed good health throughout the entire voyage from Fernando Po to Genowa, the river port of Hamanua, and back, extending over four months.

He attributed the freedom from sickness to the perfect arrangements for preserving health—the stowage of the green wood in boats, not in the ship's bunkers; the purifying of the bilge water by means of the chloride of zinc; the liberal administration of wine medicated with sulphate of quinine; and preservation of hilarity on board.

Mr. HUTCHINSON exhibited several products of the country passed through, which he described as being luxuriant in the extreme.

Mr. NISBET read a paper "*On Blasting of Rocks*," which has been published.

## ELEVENTH ORDINARY MEETING.

ROYAL INSTITUTION.—March 19th, 1855.

JOSEPH BROOKS YATES, Esq., F.S.A., SEN. V.P., in the Chair.

J. F. FOARD, Esq., was balloted for, and duly elected an Ordinary Member.

Dr. THOMSON drew attention to the great mortality of certain shell fish upon the shores of the Forth, attributed to the severe frost, with the view of enquiring if a similar phenomenon had been observed upon the Mersey and the Dee.

[Mr. ISAAC BYERLEY, F.L.S., at a subsequent meeting, reported that he had been unable to ascertain that the mortality had been greater than usual; one of the *Solens* which had perished in such numbers at Portobello being rare here.]

Mr. T. C. ARCHER exhibited a number of curious vegetable products, amongst which were a bottle of shea butter, prepared from the *Bassia Latifolia*, Nat. Ord. *Sapotaceæ*; a fine specimen of the lace bark and section of the wood; leaves of the *Erythroxylon coca*, the narcotic coca of the Peruvians; the churrus of the East, procured from *Cannabis Sativa*; the fruit of the *Argan* tree of Northern Africa, valuable for its oil; and two new fibres, one called *tecum* (from a palm), and the other, from the bark of the *Bertholletia excelsa*.

Mr. YATES exhibited autographs of Charles V. of Germany, and Francis I. of France.

In the absence of the Author, Dr. Thomson read the first part of a paper "*On the present state of the question of Compass disturbances and mode of adjustment in Iron Ships, and the difficulty of dealing with it,*" by the Rev. W. Scoresby, D.D., F.R.S.S.L. & E., Member of the Institute of France, &c.: a considerable portion of this paper has been published in the *Athenæum*.

## TWELFTH ORDINARY MEETING.

ROYAL INSTITUTION.—April 16th, 1855.

JOSEPH BROOKS YATES, Esq., F.S.A., SEN. V.P., in the Chair.

The Rev. H. H. HIGGINS exhibited two cases of local insects, from the collection which is being formed in the Royal Institution Museum.

Mr. T. C. ARCHER exhibited a section of one of the Brazilian climbers, which displays transversely a Greek cross; also a specimen of the "trial nut," or ordeal bean used by the natives of Calabar, and read an account of Dr. Christison's observations upon its poisonous qualities.

The concluding part of Dr. Scoresby's communication was then read.

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## THIRTEENTH ORDINARY MEETING.

ROYAL INSTITUTION.—April 30th, 1855.

JOSEPH DICKINSON, M.D., F.R.S., &c., PRESIDENT, in the Chair.

Mr. Enoch Harvey's resignation was accepted.

The papers read before the Society were:

"*On Trade and Partnership—the relative duties and proper liabilities*

of the Merchant and the State," by Swinton Boulton, Esq.; which has been published by the author.

"On the Mosses and Jungermanniæ found within twelve miles of Liverpool and Southport," by Mr. F. P. Marrat; (*vide* Appendix).

## FOURTEENTH ORDINARY MEETING.

ROYAL INSTITUTION.—May 14th, 1855.

JOSEPH DICKINSON, M.D., F.R.S., &c., PRESIDENT, in the Chair.

It was resolved, upon the recommendation of the Natural History Sectional Committee, confirmed by the Council, that during the recess the Society should make two Natural History excursions.

Mr. T. C. ARCHER exhibited two specimens of the Trepang, a species of *Holothuria*, from the Indian Archipelago,—an animal largely exported to China, and used as food.

Mr. BYERLEY exhibited two new Crustacea found at New Brighton, the *Dexamine carinospinosa* and *Idotea linearis*.

Mr. MORTON exhibited a fine specimen of the *Phascolotherium Bucklandii*, from the Stonesfield slate—green oölite.

Dr. THOMSON presented a specimen of Vitrified Fort, which he had got on the "Top of Noth," in Aberdeenshire, and described the appearances.

Mr. J. B. YATES exhibited a copy of the Whitehall Evening Post, or London Intelligencer, of August 2, 1750, containing a drawing and description of a chariot which was to run with four horses, at Newmarket, at the rate of 19 miles an hour, and accomplished the feat.

Dr. DICKINSON communicated "*Additions to the Flora of Liverpool*," (*vide* Appendix); and the following paper was read:

## ON THE MEANING AND HISTORY OF SURNAMES.

By REV. A. RAMSAY, M.A.

"What's in a name? That which we called a rose,

"By any other name would smell as sweet."

Thus sings our great dramatist; and yet all things that we see and know of around us—countries, towns, animals, plants, minerals, and

flowers—have each a distinctive name and title, often, as in the case of the very flower which the poet instances, descriptive of its appearance, its origin, its qualities, or its locality. Much more is it so with men. We may perhaps not be aware of it; but still it is a fact that every name, whether christian or surname, has a meaning—a meaning often containing within itself a miniature history, as it were, of its owner's ancestry, their appearance, their occupation, their deeds, their place of abode, and perhaps much else connected with them. Names moreover, like other things apparently trifling, often exercise a wide-spread and deep-seated influence over the minds of men, which we are at a loss to account for, unless we refer it to the wonderful power of association. The Greeks knew this when they changed their "Pontus Axenus," or "Inhospitable Sea," to "Pontus Euxinus," or "Hospitable Sea;" and the Romans, when they altered their *Maleventum* unto *Beneventum*. The first Napoleon also must have been well aware of this when he changed the original Italian form of his name, *Buonaparte*, into Bonaparte, in order to give it a French air—to conceal his Corsican, and to claim a Gallic origin; and in our own days we have witnessed the spell which a name may throw over a whole nation.

The origin of many Christian names is given in the Bible. Thus "Adam" means "Red Earth;" and the name was doubtless given to the first man to remind him that he was, after all, but "dust and ashes." It may be observed, that we have a good instance of the two possible meanings of the word in Isaiah xlv. 11: "And the workmen, they are of men;" which Bishop Lowth renders, "Even the workmen themselves shall blush;" making the word our translators interpret "of men" to signify "grow red through shame," or "blush." Abraham was in name, as well as in fact, "The Father of Nations." Jacob, which has now taken the different forms of Jacques, James, and Jachimo, signifies a 'supplanter;' and a knowledge of this meaning of the name gives us a deeper insight into, and affords a fresh illustration of that passage. "Is he not rightly named Jacob? hath he not supplanted me these two times?" Shakspeare, who in addition to the wonderful minuteness and variety of his knowledge, had above all men an inborn sense of the fitness of each thing for its own place, has given to the one of his characters, who is eminently a plotter and a supplanter, the name of Iago,—the Spanish form of the Hebrew Jacob and our James,—Iago, the supplanter. Moses appears to be a coptic word, signifying "Water," or, according to Josephus, "Drawn out of the water," and was the name given to the prophet who bore it, when he was rescued from the waters of the Nile by Pharaoh's daughter. Joshua again means "God

is our Saviour;" Saul "The asked-for man;" David "The beloved;" Solomon, like our Frederic, means the peaceful; Jeroboam, "Oppressor of the people;" Daniel, "Judge of God."

Many of the New Testament names also, whether it be by foresight or accident, have a peculiar appropriateness of meaning. Thus the name Peter, which signifies a rock or stone, illustrates that passage, in which our Saviour says, "Upon this rock will I found my church." To the disciple again, who refused to believe in our Saviour's resurrection till he could convince himself by sight and touch, there belonged the singularly appropriate name of "Thomas, the Doubter;" Didymus and Thomas being exactly equivalent. But the list of these Bible names might be multiplied infinitely.

Many of the old Greek names too seem singularly fitted to the persons who bore them, such as Demosthenes, or "The people's strength;" Philip, "The lover of horses;" Alexander, "The man-repeller."

Much more might be said about names in general, but my subject now is Surnames. The derivation and meaning of this word "*surname*" has itself been much disputed. Till the middle of the last century, it used constantly to be spelt with an 'i' instead of with a 'u,' as it is now; and still more anciently it was often written sire-name. This mode of spelling shows that the sir-name or sire-name, was so called because it was the name a man derived from his *father*, and this we shall see it very often was. Now, however, the more general derivation is from the French "*sur*" (over or above), making the word to mean the name which we have over and above our Christian name. The circumstance that this *supra-nomen* or surname was at one time written above (*sur* or *supra*) the Christian name, is much in favour of this view. Without however canvassing the merits of these two derivations, we may, I think, at once assume that both are correct; or rather, that the two are entirely different things; and that the "Sire-name," or sirname, is distinct from, and much anterior to, in fact is the oldest form of the hereditary "Surname," which was introduced into this country by the Normans.

Thus the Sire-name is a name indicating the ancestry of the individual; whereas the surname was descriptive of

- (1) Some moral or physical quality which he possessed;
- (2) Of the trade or profession which he exercised; or
- (3) Of the locality from whence he came.

We shall treat of both of these, the "Sire-name" and the "Surname," in order. The Sire-name, as being the oldest, first claims our attention.

The Sire-name has existed from the very earliest times. Its simplest form was the addition of some word signifying "Son" to the father's name, such as the Hebrew "Ben" in *Ben-hadad*, *Ben-hassan*, the Syriac "Bar" (probably allied to our English *bairn*), in *Bar-jona*, son of Jonas, *Bar-jesus*, *Bar-abbas*, and *Bar-nabas*, or the Arabic *Ibu*. Among all the eastern nations such Sire-names were common. Thus *Mirza* means "Emirs Son," and *Parysatis* "of fairy race."

In Greek these Sire-names were, as we all know, exceedingly common. We find them in such forms as *Pelides*, *Atrides*, *Simonides*, and *Heraclides*; and possibly many such names as *Reagenes*, *Diogenes*, and *Hermogenes* may have had a similar origin.

In Latin the numerous class of names ending in "ius," such as *Publius*, *Marcus*, *Julius*, &c. are generally thought to be patronymics. To these Camden adds such forms as *Lucipor*, *Marcopor*, *i.e.* *Lucu puer*, and *Marcu puer*; but in these combinations "puer" seems to have meant "a slave."

The ancient Celts had many forms of the patronymic. The one most common among those who inhabited our own country, was produced by prefixing the word *Ap*—which appears to be an abbreviation of the Celtic "*Mab*," a son, and connected with the Gaelic "*Mac*"—to the father's name, as *Ap Richard*, *Ap Hugh*; *Ap Evan*. In this manner a great number of the Welsh names of the present day have been formed. But with our English tendency to abbreviation, we have in very many cases dropped the initial vowel, so that instead of *Ap Richard* we say *Pritchard*, *Price*, and *Bryce*, equivalent to *Richardson* or *Dickson*; in like manner, *Ap Hugh* has become *Pugh*, *Ap Evan* *Bevan*, *Ap Harry* *Parry* and *Barry*, *Ap Robert* *Probert*, and *Ap Howell* *Powell*.

Many curious and ridiculous stories are told about the tendency of the Welsh to carry up their descent to an almost interminable point\* by means of these *Aps*; but perhaps the best satire on this pride of pedigree is that of the wit who describes cheese as being

"Adam's own cousin-german by the birth—

*Ap Curds, Ap Milk, Ap Cow, Ap Grass, Ap Earth.*"

Most of the modern Welsh surnames have been formed by the addition of an "s" (the sign of the genitive case) to the father's christian name. Thus, *Peter Williams* meant *Peter the son of William*, and was equivalent to our *Peter Williamson* or *Wilson*, *David Johns* to our *David Johnson* or *Jackson*, and *Dauids* to our *Davison* or *Dawson*.

\* The church of *Llangollen* is dedicated to a saint, whose name, by these continuous *Ap*s, takes up three lines of small print, and contains 21 letters of the alphabet three times over.

Many of these names, however, have undergone a second abbreviation. Thus, Johns has become Jones, Davids Davis, and Harry's Harris.

As however these christian names are but few in number, when they become surnames, descending from father to son, their paucity renders them comparatively useless. Thus it is not uncommon in Wales to find a whole village populated with Jones, Williams, Roberts, and some half dozen other patronymics of this kind ; and this may in some degree account for the very limited number of Welsh names.

In Ireland, and Scotland, the Celtic form of the sire-name was obtained by prefixing the little word "Mac," equivalent to our "son," as in Mac-Donald or Donaldson, Mac-Pherson, Mac-Neile, Mac-Rae, and Mac-Ready.

Another form of the sire-name in these two countries takes its rise from the prefix "Oy" or "O," meaning a "grandson." Thus, we have O Connell, O Connor, and O Neil, the latter signifying Neilson, or rather "Neil's grandson." The wits have been as facetious on the "Macs" and "O's" as on the "Aps." Witness the following well-known translation of two well-known Latin lines :—

" By Mac and O  
 " You'll always know  
 " True Irishmen they say ;  
 " For if they lack  
 " Both O and Mac,  
 " No Irishmen are they."

Other Celtic forms of the patronymic which prevail in these countries, are obtained (1) by prefixing the word Clann (= offspring or children), as in Clanricardé (= Richardson), Clann Donnell, *i.e.* Donald's children or the Macdonalds ; (2) by the affix "ach," an abbreviation of the Celtic "Merch," a daughter, as in Gnogarach (= Mac-gregor) Grantach, &c. ; and (3) in Irish sire-names, by the prefix "ni" or "nic," a daughter, as Mabel ni Neill, *i.e.* Mabel O Neill, Caitrin McSeain, or Catharine Johnson.

Among the Saxons, the sire-name had a great variety of forms. One of the oldest of these was obtained by the affixing of "ing" (meaning offspring), to the father's name.\* Thus in a genealogy of the West Saxon Kings we have Edgar Eadmunding, Edwarding, and so on up to Seefing, which Seef (adds the chronicler) was Noah's son, a specimen of carrying the pedigree tolerably high. So too in the Anglo-Saxon translations of the Bible, we find the son of Elisha called Elising ; and the

\* All these terminations, "o," "ing," "ock," "o'kin," are constantly used as diminutives ; "ing," for instance, in such words as "duckling," "goosling," "darling ;" "ock," in "hillock," "bullock ;" "kin," as in "lambkin," "maimikin." The diminutives "et" and "ey," are also



old name of the town of Birmingham was Beorm-inga-ham, i.e. the home of the descendants of Beorm. Modern sire-names of this class are Dering, Browning, and Whiting, meaning dear, dark and fair offspring; and Manning, Harding, and Jennings, the latter equivalent to Janson or Johnson.

Another Saxon form of the sire name was produced by appending the termination "ock," an affix having the same meaning as "ing." Thus we have Hancock equivalent to Jennings and Johnson, Alcock to Harrison, Pollock to Paulson, Pawson, Porson or Polk, and Mattock or Matthew's son.

A third Saxon ending by which a sire-name or patronymic is formed is that of "kin," perhaps allied to the German *kind*, child. Thus besides Johnson, Jennings, and Hancock, we have also Jenkin; for Peterson we have Peterkin and Perkin; for Davison, Dawkin; and for Harrison, Hawkin; and Guillotin (whose sanguinary invention has rendered its owner's name immortal), is but the French for Wilkin or Wilson.

But by far the most common of the Saxon affixes is the word "son," appended as it is to almost every Christian name we can think of, and to many of these in very different forms. Thus from John we have Johnson, Jackson, Janson, Hanson, Hankinson, and Evanson; from Robert we have Robertson, Robinson, and Robson; and from William, Williamson, Wilson, Wilkinson, &c.

The termination "son" in its different forms, abounds in many northern countries. The Norwegians use both "son" and "dalter" (daughter) as affixes. In Iceland, Johnson is the most common name; and because this "son" is likewise a Danish termination, Mr. Worsae in his *Northmen in England* seems inclined to claim our great British Admiral Nelson as a countryman by descent, remarking that the great man was born in one of the districts early colonized by the Danes. Nelson, however, may belong to the same class of names as Anson, Patti-son, Moxon (i.e. Meggi-son), and other derivatives from the mother's christian name; or it may, like Nielson, be a contraction of Nicholson.—(See Polt's Person. Nam., p. 115.) The analogy of Swainson, which is evidently from the Danish King Sweyn, is in favour of Mr. Worsae's derivation.

The Normans formed their sire-names by prefixing "fitz," a corruption

similarly used in patronymics, as in Bartlet, or Bartholomew's son, Colet or Nicholson, Gillet, Elliot, Willey, Huey, and others; and we may observe, that the terms used to signify "offspring" and "diminutiveness," are constantly connected, as in pu-er, pu-ella, and pu-sillus.—(See Polt. Etymol. Torsch., vol. 1. p. 90.)

of the Latin *filius*, to the father's name. In the roll or list kept at Battle Abbey, of the nobles who came over with William the Conqueror, at least 100 names begin with Fitz. Thus Fitz-roy was the king's son, and the first person who bore that name was an illegitimate son of our Henry I., whose betrothed, a wealthy heiress, made his want of a surname an objection to her marriage with him. In the old chronicles the lady is represented as saying—

“ It were to me great shame  
To have a lord withouten his twa name.”

Upon which the king to remedy the defect, gave the young man the surname of Fitz-roy, a name which has been given at several subsequent periods to the illegitimate progeny of our kings.

In Russia, instead of placing the Fitz before the father's name, they place it after. Thus the eldest son of the Czar is called the Czar-owitch. Peter the Great's name was Peter Alexiowitch, while the late Emperor's name was Nicholas Paulowitch, and that of the present Emperor is Alexander Nicolaievitch.

Various other corruptions of this same adjunct “*filius*” are found among other nations. With the Scotch it takes the form of “*vich*,” and the name of “*Vich Ian Vohr*,” son of John the Great, is familiar to all the readers of *Waverley*. With the Italians *Figio-vanni* and *Fili-petri* are equivalent to our Johnson and Peterson; and the Hungarians append to their sire-names the same word, in the very abbreviated shape “*fi*,” as *Petoſi* (= *Fili-petri*), *Laczofi*, &c.

Other terminations used in the formation of patronymics, are: in Italian, “*i*,” “*y*,” and “*cini*,” as in *Stephany* (*i.e.* Stephenson), *Pallavacini*, &c.; and in Spanish and Portuguese, “*z*,” as in *Diaz*, *i.e.* Diego's son, and *Rodriguez*, *i.e.* Roderick's son.

The Latin genitive is also sometimes found in German names, as in *Ernesti*, *Jacobi*, and *Ulrici*.

The French likewise sometimes prefix the preposition *De*, their sign of the genitive, as in *Danton*, *i.e.* D'Antoine, or Antony's son; and our own name *Dobree* is a corruption of *D'Aubry*, *i.e.* Albertson.

Besides the affix “*vitch*” already noticed, the Russians in common with the Poles employ as patronymic terminations, “*sky*” or “*sko*,” as in *Petrowsky*, *i.e.* Peterson, *Koskiusco*, *Poniatowsky*, and others; “*off*” as in *Dawidoff*, *i.e.* Davidson, *Demidoff*, *Menschikoff*, &c.; “*kin*” as in *Iwashkin*, *Goloffkin*; and as a feminine termination. “*owna*” as in *Alex-andrena*, or Alexander's daughter.

Having said thus much on the *sire-names*, I now come to the *sur-*

names. These will be found to have arisen in most cases, either from some physical or moral peculiarity of the owner, from the trade or occupation which he followed, or from the name of the place where he lived. Of the first class are such names as White, Black, Brown, Reed, Lightfoot, and so forth; of the second, Smith, Taylor, Baker, Miller; and of the third, Hill, Dale, Lancaster, Derbyshire, Crosby, York, &c.

We will first consider those derived from some physical peculiarity. Such names have been more or less common among all nations. With the Greeks indeed they were not of very frequent occurrence, the majority of their names being derived from moral rather than physical qualities. Still we find among them such names as Plato, by many supposed to mean "He with the broad forehead," Glaucus, Callisthenes, &c. Among the Latins, however, such names abounded. We have for instance, from some prominent feature of the face, Capito (*i.e.* Great-head or Grostete), Tronto or beetle-brow, Naso and Nasica or bottle-nose, Labrenus or thick-lips, Dentatus, Crispus, and Cincinnatus or curl-pate; from some physical defect, we have Cocles (one-eyed), Strabo (squint-eyed), Scævola (left-handed), Balbus (stutterer), Calvus (bald-pate), Claudius and Clodius (limper), Varus (bow-legged), Flaccus, Valgius, Cæsius, Petus (pink-eyed), Silo, Pansa (splay-foot), Scaurus, Pedo (long-shanks), and a host of others.

The same class of names were common among the Saxons. In the life of Hereward, the last Saxon who held out against William the Conqueror, we find such names as "Marten with the light foot," retained in our name "Lightfoot," "Siward the Red," "Walric the Black," &c.; and among our Saxon kings such names as Harold Harefoot, Edmund Ironside, &c. abound.

Again, among the French kings we constantly find such names as Charlemagne, or Charles the Great, Charles the Bald, Charles the Fat, Charles the Stammerer, &c.; and our own kings (after the Saxon times), had generally some appellation of this kind. Thus the three sons of William the Conqueror were respectively distinguished as Robert Curthose, or short legs; William Rufus, or red-haired; and Henry Beaulerc, or good scholar: and among their descendants we have Edward Longshanks, Edward the Black Prince, Richard Lion-hearted, John Lackland, &c.

On proceeding to classify these names we find that a large number of them have been drawn from the hue of the complexion, or the colour of the hair. Thus from their dark swarthy complexion we have the Greek Metas, with its derivative Melancthon (= Schwarzerd, his original

name), the Latin Niger and Tuscus, the Celtic Aidan (=Niger), Dugald (=the dark stranger), Douglas\* (*i.e.* black and blue), Dibdin (*i.e.* dubh duin or black man) Roderick Dhu, Evan Dhu, Macduff, Duff and Dee, the German Schwarz, the Polish Czerny, the Russian Tschernitscheff, the French Le Noir, Le Brun, *Maurice* (*μαυρος*, *Mauritius*, *Mauritania*, *Moor*), *Morean*, *Mosell*, &c.; the English Nigel, O'Neal (from Niger), Blackman, Blacklock, Black, &c. Thus O'Connor Don means O'Connor the brown-haired, though a popular error used to prevail that the Don was a title of honour derived from the Spanish.

Of names derived from the fairness of their complexion, we have the Latin Flavius and Albinus, the Celtic Fingall (=the fair stranger), the Saxon Harfager (the same as Fair-fax or the Fair-headed), Blondel, Blundell, Bianconi, Weissman, Fairbairn, Fairchild, White, Whiteman, Whitehead, Whitelocke, Lilywhite, and others.

It is curious to observe the number of celebrated characters who have derived their names from the redness of their hair, face, or beard. We have the Greek Pyrrhus, Frederick *Barbarossa* (*i.e.* Frederick with the red beard) of the earlier Crusade, together with his name-sake *Barbaroux*, who figured so conspicuously in the first French revolution; we have the Norman William *Rufus*, the valiant Prince *Rupert*, the poet and sentimentalist *Rousseau*, the musician *Rossini*, the statesman *Russell*, and the freebooter *Rob Roy*. To these celebrated names we might add others less notorious, as the Latin *Rufinus*, *Rupillus*, *Rutilius*, *Burrus*, and *Ænobarbus*; and among foreign and English names *Ruprecht*, Robert *Rossi*, *Leroux*, *Rous*, *Rothman*, *Ruddemann*, *Rudd*, *Reed*, *Redhead*, *Redman*, O'Connor *Roe*, and the Celtic *Lloyd* and *Gough*.

Besides these derived from the nature of the hair or complexion, we have a vast number of other names taken from the general appearance of the individual. We have for instance our "Longs" and our "Shorts," our "Biggs" and our "Littles" and "Smalls," our "Stouts" and our "Thynnes," our "Planes" and our "Hansoms," our "Quicks" and our "Slomans."

A large proportion of this class of names take their rise from the prowess of the original owners in war, such for instance as *Strong-i-the-arm*, *Armstrong*, *Wightman* (*i.e.* Strong-man), *Mitchell* (*i.e.*

\* There is a small village in Carnarvonshire called "Llandulas," which the inhabitants, when they wish to express its name in English, always term "black and blue," (*du*=black, (*g*)*las*=blue). The "du" we have in *Du(b)lin* *i.e.* black pool; and the readers of *Waverley* will recollect that the English and Scotch soldiers are there respectively characterised as "*sidier roy*" and "*sidier dhu*," according as they wore the scarlet uniform or the tartan plaid.

Big), Shakespear, Breakespeare, Wagstaff, Bickerstaff, Fortescue, Strongbow, Beauharnais, Harness, &c.

Names derived from moral or mental qualities, which also belong to this class, have been common among all nations. Among the Greeks we have Sophocles, Socrates, Eubulus, Thrasybulus, Sophroniscus, &c.; among the Latins, Lepidus, Tacitus, Probus, Cato, Pius, Severus; and among ourselves, such names as Good, Best, Wise, Meek, Proud. Many of the old Saxon names belonged to this class, such as Albert, Alfred, Ethelbert (Nobly-bright), Ethelred (Nobly-spoken), &c.

This system of nicknames, for they are after all nothing more, continues to the present day in many parts of Lancashire, Yorkshire, and Staffordshire. The parties owning them have indeed another name, such as Smith, Jones, or Williams, but these are not for use; they are, as it were, stowed carefully away out of sight, and like their Sunday clothes only brought out to figure on high days and holidays, christenings and weddings. For every-day purposes they use some classical nickname, translating the Roman Naso, Fronto, or Bibulus, by some such elegant appellation as Nosey, Bullhead, or Soaker; and these are employed not by their neighbours only, but by their wives and children, and even by themselves. The following illustrations of this practice are quoted by Mr. Lower, from a correspondent of the *Gentleman's Magazine*. "An apothecary in the collieries always entered the real name of his patients in his books, *i.e.* when he could ascertain them. But they stood there only for ornament; for use he found it necessary to append the nickname, which he did with true medical formality, as for instance, 'Thomas Williams,' vulgo dict. 'Old Puff.'" Clergymen have been known to send away a wedding party in despair, after many vain attempts to elicit from the bride or bridegroom by way of a name, some sound, which any known letter in the alphabet had the power of representing on paper.

We have however dwelt long enough on surnames derived from physical peculiarities, and we now come to the second great class, namely, those which take their rise from trades and occupations.

Names of this kind are common among all nations; and from them we may trace something of the character and pursuits of the people to whom they belong. Among the Romans, for instance, a large proportion of these surnames point to their fondness for agricultural occupations. Such are Agricola, Rusticus, Cicero (from *cicer* a vetch), Fabius (from *faba* a bean), Lentulus (from *lens* pulse), Piso (from *pisum* a pea), and Cœpio (from *cape* an onion), all of whom were probably so called because the first of their respective families were celebrated for the

successful cultivation of these herbs or vegetables. Those derived from trades on the other hand, such as Figulus, Fabricius, Pictor, Scribonius, are but few in comparison. The same process of analysis might be applied to the Saxon and Norman names derived from trade, but our business now is more particularly with those in vogue among ourselves. Foremost among these stands the world-wide name of Smith, a name which has given rise to a host of witticisms, good, bad, and indifferent; Smith the universal alias. When the head of the great house of Carrington, a partisan of Richard the Third, forsook his paternal estate, he became a John Smith; and when the quondam King of the French, Louis Philippe, ran away from his country and fled for his life, he became Mr. William Smith. An old antiquarian (Verstegan "Restitution of Decayed Antiquities," 1574,) tells us, what appears obvious enough, that Smith is the man that *smiteth* at the anvil—

"Whence cometh Smyth al be he knight or squire,  
But from the smith that *smiteth* at the fire."

Many of the modern Smiths, however, repudiate this plebeian descent. Some attempt to disguise it by spelling the name with a "y," and appending an "e" at the end. Others assure us, with a certain degree of truth, that the smith of ancient days was a very different person from our smith; that he was in fact an armourer, and as such required both art and capital, and bore a greater resemblance to our jeweller, than to the smith of the present day. Others even venture to derive their name from Shem the son of Noah—thus, Shem, Shemit, Schmit, Smith, a derivation which forcibly reminds us of that which deduces "cucumber" from Jeremiah King.

The Smiths are truly an extensive family. Though, curiously enough, Blacksmith and Whitesmith do not (so far as I know) exist as surnames, we have Goldsmith, Shosmith, Nasmyth, or nail smith, Brownsmith, *i.e.* the man who made the far-famed brownbills of our warlike ancestors, Arrowsmith, *i.e.* a brazier, from "ar," Saxon for brass, Sixsmith, originally Sock-smith, sock being the old English for a plough-share.

The Scotch for Smith is Gow, and the Gows and Gowans in Scotland were once as numerous in proportion as the Smiths in England, although they may not be so now, owing to a great number of them having translated their names into the English Smith, on their migration to other countries.

The German Schmid and the French Lefevre are also common in their respective countries.

But passing on from the Smiths and their relations, we have many

other names from trades—Masons and Millers, Bakers and Butchers, Carters and Wagners, Tylers, Slaters, and Hilliers, Coopers and Cartwrights, Shepherds and Sadlers, Naylor and Taylors, Turners, Colliers, Dyers, Potters, Stewards, and many others at first sight not so obvious. Thus Latimer was a writer of Latin, Chapman (*i.e.* cheap man) a pedlar, Lavender, and its contraction Landor, a washerman, Thacker a thatcher, Barker a tanner, Arkwright a maker of meal chests, Tupman a breeder of rams, Jenner a joiner, Milner a miller, Baxter a baker, Webb and Webster a weaver, Forster a forester. Brewster a brewer, Kempster and Comber a wool comber, Sangster a singer, Raper a roper, Chalmers a chamberlain, Landseer a land surveyor, Burder a fowler, Trotter a running footman. To these we may add a numerous class ending in “ward,” equivalent to our “guard,” as Kenward the dog-keeper, Durward the door-keeper (equivalent to Drouyn de Lhuys), Woodward the forest-keeper, Aylward the ale-keeper, Coward the cow-keeper.

Names of this description are not only common among our historical characters, such as Wat Tyler, or Walter the tyler, and Jack Cade,\* or John the cask maker. Many of the names also of our royal and titled families take their rise from the occupation of their forefathers. Thus the name of Stuart, borne for centuries by the royal families of England and Scotland, descended to them from Walter, grandson of Banquo, who, upwards of 700 years ago, in the reign of David I., was Steward of Scotland. This office of Steward was then hereditary, and descended from father to son for several generations, till it came to Robert the Steward, who eventually became king, and was the first Scottish king of that name. Spenser was Le Dispenser, *i.e.* the dispenser or steward; and the ancestor of the family Spenser, Duke of Marlborough, was Steward of William the Conqueror. So too, the first of the Grosvenor family was “le gros veneur,” or the great huntsman to the Dukes of Normandy. Napier again (in connection with which name a well-known story has been invented deriving it from *na-pier*, *i.e.* no peer), was originally the hander of the “napery” (as table linen was then called), to the king, one part of whose duty it was to give over the old linen to the king’s almoner for distribution among the poor. Such names as Chamberlain, Coke, Howard, Constable, and Webster, might afford us further instances.

Sometimes we find the occupations or professions which give rise to

\* Cade (Lat. Cadus), in old times meant a ‘cask.’—See Shakespeare. Henry VI. 2. P.

CADK.—We, John Cade, so termed our supposed father.

BUT.—Or rather of stealing a cade of herrings.

names of this class continued in the family for several generations. Thus the trade of weaving has been carried on by a family named Webb as far back as the traditions of the family extend, probably ever since the assumption of the name as a surname. Webb, derived from *weben* to weave, it may be remarked, is connected with a numerous family of words, such as "web," "woof," and according to Trench (*Study of Words*, p. 43), "wife." The name Colman also has been borne for centuries by charcoal burners. This often gives rise to a singular appropriateness of name, which however as often arises from mere chance, as in the case of Demosthenes (=people's strength), and as Herapath happens to be a good name for a railway journalist, inasmuch as it means the "king's highway."

Many of the parties possessing names of the class derived from trades and professions are ashamed of their origin, and attempt to disguise it by some novel mode of spelling, or by tacking a French ending to them. Thus, some Smiths will write their names Smythe, Gardener becomes Gardiner, Fielding Feilden, and Taylor Tayleure. One of these Tayleures, as the story goes, once upon a time demanded of a farmer the name of his dog, to which the honest son of the soil replied, "Why sir, his real name is Jowler, but as he is a consequential kind of a puppy, we calls him *Jouleure*." More generally known is the reply of Fielding the novelist, to Feilden, Earl of Denbigh, with whose family his own was closely connected. On the latter enquiring how it happened that they spelt their names differently: "I cannot tell my lord," the wit is reported to have said, "unless it were that my branch of the family was the first to become acquainted with the difficult art of spelling."

Swift tells us of a citizen who added or altered a letter in his name for every plum that he acquired, his surname undergoing the following transformations:—Furnace, Furnice, Furnise, Furnisse, Furnese; so that, as the wit remarks, a change of letter by the graver would make him akin, in name at least, to an Italian princely family, the Farnese.

We now come to the third great class of surnames—local names. All quarters of the world are laid under contribution for their names. We have North, South, East and West. A large number of these names, such as Warren, Percy, Devereux, Baskerville, &c. come from Normandy. So numerous are these Norman names, that Camden justly remarks, there is hardly a village in Normandy but what has given denomination to some family in England: some again come from other parts of France; some from the Netherlands. Of these again, some are crusading names, as Mortimer (de Mortuo Mari), Dacre



(D'Acre), Mountjoy, Jordan; Beamish doubtless comes from Bohemia, Brett from Bretagne, Burgoyne from Burgundy; and with these latter, we may compare such names as Phinn, Holland, France, Ireland, Gaskin, Wallis, &c. But by far the greater number of these local names are English. Of these some are derived from prominent features of the country: such as Hill, Dale, Wood, Mountain, Heath, Pool, Lake, Ford, Bridge, Brook, Moore, Bank. Others take their rise from the original county of their owner: such are Cheshire, Derbyshire, Kent, Essex, Oxford, Buckingham; and we have a surname corresponding to almost every county in England. The Reformer Wycliffe took his name from Wycliffe in Yorkshire, where he was born. Two or three generations after the Norman conquest, the commonalty were generally called after their place of abode. Thus in old deeds we constantly find names such as "John over the water," "Peter at the willows," "William at the hall," "Thomas at the oak." These after a time usually suffered some corruption. Thus, that well known litigious personage, Mr. John Nokes, was originally "John atten oak," as his constant antagonist was "John at style." In like manner Alten-ash became Nash, Alten-eye or at the island, Nye,\* At the rill Trill, At the rigg (*i.e.* ridge or hill), Trigg; and that elegant surname Shufflebottom was originally nothing more than Shaw-field-bottom. Sometimes the At is retained in this class of names, as in Atmore, Atwood. It is easy to see the origin of these names. If a man lived near a hill he would style himself At-hill; if on a moor, by a wood, or near a lake, church, or wall, he would be called Atmore, Atwood or Underwood, Atmere, Atchurch, or Atwall. Sometimes "By" takes the place of "At," as in Bywater, Bytheway, Byfield, Bygate, and others; and sometimes some other prefix is used, as in Underwood, Underdown, and Surtees, a Durham family whose possessions lay on the river Tees. One of the most common endings of these local names is "Ton" or "Town." Thus we have Upperton, Huyton, Houghton, Hilton and Lowton, Norton, Sutton, Aston and Weston, Middleton, Newton (a name given to many of the oldest places in England), Alton, Milton (Muhlhausen), Clayton and Leighton. This last name is derived from ley, a field or meadow, a word used by Gray in that well-known line of his—

"The lowing herd wind slowly o'er the lea;"

And a word which itself forms the termination of a numerous class of names. As we have Norton and Sutton, so we have Norley, Astley, and Westley, Stanley, Oxley, and Horsley, Oakley, Ashley, Bromley.

\* N is often transferred in this manner from the end of one word to the beginning of another, as newt was originally "an ewt," and an adder became "nadder."

The Parish of Leigh in Lancashire includes Westleigh, Astley, and Tyldesley, which I should suppose to have been the most cultivated part of the parish, the *tilled* land. Other common terminations of this class of names are Moor, Stoke, Combe, and Holm; and some of these local names add "man" to the locality, which they designate as Moor-man, Marsh-man, Pit-man, &c.

The three classes we have already treated of comprise most of the surnames in use among us. There are, however, a considerable number which cannot be included within these limits, or about which there is a difficulty of determining to what class they actually belong.

Such are those which are derived from titles, or are in any way historical. A great proportion of these might have been included in the first class, which we have already discussed. They are however, on the whole, important enough to deserve a separate notice.

It would be curious to trace out the number of these which signify "king" or "ruler." In all nations some such name has been common, especially among members of the ruling family. Pharaoh, a usual name of the Kings of Egypt; Candace, of the Queens of Ethiopia; Darius, of the Monarchs of Persia; and Cæsar, of the Roman Emperors; all signify Rajah, Czar,\* or ruler. In addition to these, we have from the Hebrew, Melchior and Malchus; from the Greek, Archias, Archelaus and Basil; from the Latin Rex and Regulus; the Gallic Brennus, which is connected with the Welsh "Brenin," a sovereign, (in the language of Bretagne we meet with the same word under the form Brens); and of more modern names, Le-roi, Kœnig, Charles, (which is generally derived from the Anglo-Saxon "Ceorl," a churl or countryman, but more probably connected with the Slavonic "korol' or "krol," a king,—itself allied to the root C<sup>o</sup>r, head, which we find in the terms *cor-nu*, *corona*, *crinis*, *cranium*, *cer-ebrum*, &c.) King, Prince; besides many others drawn from inferior titles, as Duke, Earl, Marquis, Baron, Lord, Knight, Squire, Reeve, &c.; and some from ecclesiastical offices, such as Bishop, Priest, Deacon, Parson, Friar, Monk, Vicar, Dean, Abbot, Cardinal, and even Pope.

The origin of many of these is of course involved in uncertainty. Doubtless they were in the first instance either *bonâ fide* titles or Christian names. As an illustration of Christian names of this kind, I

\* It has been attempted to derive the Russian "Czar," as well as the German "Kaiser," from the Latin Cæsar, itself said to be derived from *cæsaries*, the hair (comp. Crispus and Cincinnatus). The word Czar, however, is far more probably allied to the Slavonic *tejsar rex*.—See *Pott. Personen Namen*, page 22.

may mention that I once knew in one parish a Major Vidler, General Beaton, and Admiral Parker, where these titles were the *bona fide* Christian names of the parties.

Simple historical names are much easier to trace. Such among the Romans were Torquatus, Corvinus, Coriolanus, Africanus, Germanicus, and others taking their rise from the circumstance of some well-known battle or campaign.

An account of some of these historical names may embalm a good deal of useful history and pleasant anecdote.

To take for instance, the family names of our kings of England: we all know that the name of Plantagenet took its rise from the ancestors of that family wearing as a badge the "*planta genista*" or broom plant, though it is perhaps not so well known that some families of Broome in the present day, claim to be direct lineal descendants of the old Plantagenets. The name of Tudor again is merely a contraction of the Christian name Theodore. "The father of Sir Owen Tudor who married the widow of Henry V., was Meredith ap Tydur, Meredith the son of Theodore."—*Camden*.

The history of the name of Stewart I have already given. With regard to the origin of the surname of our present royal family, Guelph (the word itself meaning wolf), some very curious myths are related, which however are quite as improbable and far-fetched as that which derives Napier from "*na-pier*," "*none equal*." The names Grosvenor and Spenser have already been noticed. John of Gaunt was so called from the town of Ghent, while his son Henry Bolingbroke (Henry IV.) was named after his father's castle of Bolingbroke, in Lincolnshire, in which he was born. The history of Sir Simon Lee, the companion of the good Lord James Douglas, carrying the Bruce's heart in a casket secured by a padlock, and so giving the name of Lockhart, together with the arms of a heart and a fetterlock to his descendants, is well known. One of the most curious histories of a name is given by Camden in his learned "*Treatise on Surnames*," in reference to the founder of the Grammar School at Newark. A foundling, who was brought up by the good people of Newark, received from them the somewhat whimsical name of "*Tom among us*." In after years, by an easy transition, he converted this familiar appellation into the more euphonious Thomas Magnus. He gradually rose in his profession, which was that of a clergyman, became chaplain to Henry VIII., and archdeacon of the East Riding of Yorkshire; was employed as an ambassador by Queen Elizabeth; grew wealthy; and in gratitude to his townsmen, employed his riches in erecting and endowing a grammar school for their benefit.

The real name of the celebrated Little John, the favourite companion of the still more celebrated Robin Hood, was John Little, as the old ballad tells us :—

" This infant was called ' John Little,' quoth he,

" Which name shall be changed anon ;

" The word we'll transpose ; so wherever he goes

" His name shall be called Little John."

Not a few illustrious personages derive their name from some animal. Among our statesmen, poets, and divines, have figured a Fox, a Roebuck, a Hogg, a Lamb, a Bull, and a Hare ; while a Drake, a Wren, a Sparrow, a Peacock, and a Nightingale, are equally well known to us. Names derived from animals perhaps belong properly to the first class I have treated of, and are really nicknames, taking their rise from some fancied resemblance between the first owner of the name and the animal designated by it. Such names are by no means confined to one nation: for instance, we have Hippias as well as Hengist, Horsa, and Ross ; Verres, Porcius, Leo and Hase, as well as Hogg, Lion, and Hare ; Ulphilas, Guelph, and Corneille, as well as Wolf and Crow ; besides Partridge, Rook, Raven, Blackbird, Daw, Heron, Woodcock, Crake, Crane, Hart, Sprat, Crabbe, Herring, &c.

Some are called after trees, such as Ash, Birch, Broom, Ascham, Chesney, Duchesne, Du-fresnoy ; some from minerals, such as Iron, Steele, &c. ; some from articles of diet or beverage, such as Pepper, Salt, Beer, &c. To these we may add the numerous Surnames or rather Sire-names, which are formed out of some Christian name. Thus from John, we have St. John, Jones, Jonson, Johnson, Janson, Jackson, Jennings, Jenkin, Jason, Hancock, Hanson, Hankinson, Evans, Evanson ; from Nicholas, Nicholson, Nixon, Nicholls, Nelson, Cole, Colet, Colson, Collins, Collison ; from Henry, Harris, Harrison, Herries, Hawes, Hawkins, Hall, Alcock ; from Gilbert, Gilbertson, Gibbs, Gipps, Gibson, Gibbon, Gubbins, Gell, Gilpin ; from David, Davis, Davy, Davies, Davison, Dawes, Dawkin, Dawson.

Many surnames have a religious origin. Such are especially common among Eastern nations. Thus we have Abdallah (=servant of God), Aladdin (=height of religion), Saladin and Sultan, corruptions of Sala-eddin, (=good of religion), Abed-el Kader, or servant of the Almighty, having much the same signification as our Gilchrist. The Greeks and Romans also had their Theodotus, Theodosius, Dositheus, and Deodatus ; and the Carthaginians their Hannibal and Asdrubal. In the middle ages we have Amadis, equivalent to the modern German Gottlieb or love-God ; Renè, from the Latin "renatus," or "regenerated ;" and later on we have Sancho (=sanctus), Bede, (from beda, prayer),

Gregory, (or watchful), Massinger, (a mass singer), Emerson (from aimer), Tudor (=Theodore, or gift of God). Gotobed is another form of the German Got-bet, or "pray to God," while Bidgood is also a corruption of the same name: and the well known Praise-God Barebones has its correspondent in the German Gott-lob. During the time of the Commonwealth whole sentences of Scripture were constantly adopted as Christian names, such for instance as—"Fight the good fight of Faith" Smith, "Search the Scriptures" Taylor, "Safety on High" Williams; and lists of jurors in those days are found composed entirely of names such as these.

Some of these names are taken from saints or saint days; as Giles, from St. Ægidius; Sin-clair, from St. Clair; St. John, usually pronounced Sinjon, Semple, a corruption of Sampol or St. Paul, as Sampier and Samphire are of St. Pierre, and Seymour of St. Maure. Christmas and Noel (i.e. natalis), Pascal, Christopher and Toussaint, are taken from the sacred seasons of Christmas, Easter, Good Friday, and All Saints' Day, on which their founders were probably born. In this case they correspond to the Latin Manius (a child born in the morning), Servius, Festus, &c., and to the names Spring, Summer and Winter among ourselves.

Closely allied to these religious names are those which are taken from heathen gods. Such are Nebuchadnezzar and Belshazzar, derived from those heathen idols, who are both mentioned in that passage of Scripture:—

"Bel boweth down, Nebo stoopeth,"

and from the former of these two false gods the Phœnician names Hannibal, Hasdrubal, and others derive their origin. Such names among ourselves are Venus, Julius, Thorsby, Thurton, and Thurstan, though the well known device of the thrush on the tun, to be seen at Fountains Abbey, does suggest a false derivation of the latter.

Many surnames which appear at first sight almost incomprehensible, turn out, on examination, to be mere corruptions. The roll of Battle Abbey furnishes the key to many of these. Some arise from the substitution of "field" for "ville;" thus Blonde-ville has become Blomfield, and Bosse-ville Boswell. Many again have vastly deteriorated in the process of corruption. Thus the fine old Teutonic name De Hogh Stepe, "Of the High Steep," has become Huckstep: D'Up-Haugh, "Of the Upper Hill," has degenerated into Duppa, Dumont into Dymond, Clear-brook into Clutterbuck, De Ville into Devil, Berchensty into Burster, Dudley into Deadly, and Shaw-field-bottom, as we have already seen, into Shufflebottom.

The translation of surnames is another curious subject, closely allied to that of their corruption. Some centuries ago, it was common for authors to turn their French, German, or English names into Latin or Greek. Thus the real name of Melancthon was Schwarzerd; of Grotius, De Groot; and of Næander, Neumann. Thus Key became Caius, and Gowan Smith; and this accounts for different forms of the same name, such for instance as Kemble, Campo-bello, Beau-champ, Beau-prè, and Schonau, all meaning the same as Campbell or Fairfield; also Schwarzenberg, Czernahora, and Montenegro; Drinkwater, Boileau, and Bevelacqua; Montefiore and Blumenberg; Chaucer (*i.e.* calcearius) Hosier and Schumann.

The "Chronicles of the Foundling Hospital" afford some curious details as to the manner in which surnames often arise. The original practice here was to name the unfortunate children after the first patrons of the institution; and thus in the earlier stages of its existence, we find the inmates rejoicing in such appellations as Bedford, Norfolk, Russell, Marlborough, &c. These being soon exhausted, the governors had recourse next to the names of celebrated Englishmen. Shakspere, Miltons, Bacons, Cromwells, Lauds, and Latimers abound at this period. After Nelson's visit to the institution we find Nelson, Baltic, Nile, &c. in high favour; just as now, doubtless many children are baptized with the Christian (if Christian they can be called) names of Alma, Inkerman, and Balaklava. Later on, the governors and directors resorted to the practice of giving the children their own names. This plan however was soon found to be attended with the inconvenience, that in after life many were found to be too eager to claim affinity of blood with the donors of their name. As a last resource, a list was prepared of common names, such as Jones, Thompson, and Smith, and these were applied to the new comers in regular rotation.

My subject is one on which such a variety of information starts up on every side, that although I have trespassed somewhat unreasonably on your time and attention, I feel I have done little more than make a few suggestions on the subject, which may be profitably followed out by abler heads than mine. To others I especially leave the interesting and philosophical discussion of the causes of distinctive classes of names, assuming a larger or less proportion in different nations.

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## FIFTEENTH AND LAST ORDINARY MEETING.

ROYAL INSTITUTION.—May 28th, 1855.

JOSEPH DICKINSON, M.D., F.R.S., &amp;c., PRESIDENT, in the Chair.

Mr. HUTCHINSON, who had given on a previous occasion some interesting details of the exploring voyage of the "Pleiad," exhibited a number of African curiosities, and at the request of the President communicated intelligence respecting the Filatahs inhabiting that country. The following is an account of the origin of the expedition, and of that people :

## ON THE ANTHROPOLOGY OF THE FILATAHS,

AS ASCERTAINED BY THE RECENT TSHADDA-BINUE EXPLORATION.

By THOMAS J. HUTCHINSON, Esq.

At the end of the year 1849, Mr. Richardson, an Englishman, who had been previously known by his exploration of part of the Northern Sahara, from Tripoli to Ghadamis, Ghat, and Murzuk, was joined by two Germans, Drs. Barth and Overweg, in a political and commercial expedition he was about to undertake to Central Africa, under the sanction of Her Majesty's Government. Their route was made from Tripoli through the Sahara to Damergu, on the borders of Sudan, and a frontier kingdom to Bornu, whence they travelled in different directions ; Mr. Richardson proceeding to Ungurutua in Bornu, Dr. Barth by Katshna and Kano, and Dr. Overweg by a circuitous westerly route through Guber and Mariadi, making arrangements to have Kuka, the capital of Bornu, the place of their rendezvous. All three never met again ; for Mr. Richardson died at Ungurutua on the 4th of March, 1851, twenty days before the news of the melancholy incident reached Dr. Barth, who was proceeding to Kuka, where he met Dr. Overweg. From this they went in company to Kanem, to the north of Lake Tshad, which Dr. Overweg had already circumnavigated, and on whose waters he had launched a boat named "The Lord Palmerston," at Maduari, east of Kuka, the very place where he expired on the 17th of September, 1852. Dr. Barth has since been joined by Dr. Vogel, and the news of his safety, communicated lately by Her Majesty's Consul at

Tripoli, must gratify every one as assurance of the safety and success of the most indefatigable and successful African traveller the world ever saw.

To enumerate the peculiarities of the countries visited by those enterprising men, many of them territories hitherto untrodden by European feet, is not my purpose. But I deem it necessary to notice here an extract from Dr. Barth's journal, made on his route from Kuka to Yola, between May and July, 1851, in order to explain to you the cause of the expedition which has lately ascended the Niger, Tshadda, and Binuë, and in which I picked up the few points I am about to introduce to your notice to-night. Dr. Barth writes:—"The most important day, however, in all my African journeys was the 18th of June, when we reached the river Binuë at a point called Taëpe, where it is joined by the river Faro, (in lat.  $9^{\circ} 2' N.$ , and lon.  $14^{\circ} E.$ , 235 geographical miles to the south of Kuka, and 415 geographical miles, in a direct line, east by north from the confluence of the Tshadda with the Kwarra). Since leaving Europe I had not seen so large and imposing a river. The Binuë, or "Mother of Waters," which is by far the larger of the two, is half-a-mile broad, and  $9\frac{1}{2}$  feet deep in the channel where we crossed it. On our return, eleven days later, it had risen a foot and a-half. The Faro is five-twelfths of a mile broad, and three feet deep, which increased to seven and a-quarter by our return. Both rivers have a very strong current, and run to the west into the Kwarra. We crossed the Binuë in boats made out of single trees, twenty-five to thirty-five feet long, and one to one-and-a-half feet broad, and forded the Faro, which latter was not accomplished without difficulty, on account of the strong current. The Binuë is said to rise nine days' journey from Yola, in a south-easterly direction, and the Faro seven days' distant, in a rock called Labul. During the rainy season the country is inundated to a great extent by the two rivers, which rise to their highest level towards the end of July, and remain at that level for forty days, namely, till the first days of September, when the waters begin to fall. Both rivers are full of crocodiles, and the Binuë is said to carry gold. After having crossed the rivers with some difficulty to the camels, we passed at first through some swampy ground, then through a very fine country thickly inhabited, and reached Yola, the capital of Adamawa, the 22nd of June."

Up to this period two geographical questions of importance were solved by Dr. Barth's discoveries, namely, the non-existence of a great longitudinal mountain chain, which was supposed to stretch across Central Africa in the region traversed by him; and the non-connexion



of Lake Tshad with the Tshadda river, which falls into the Kwarra or Niger, at the confluence under Mounts Patteh and Stirling. It was to verify the latter—to find out if the Binuë and Tshadda were one and the same stream, how far also it was navigable—that the steam-ship “Pleiad” was fitted out, under a contract between the Lords Commissioners of the Admiralty and Mr. Macgregor Laird; to fulfil which object she steamed from Liverpool the 17th of May, 1854. I cannot here enter into the particulars of her progress, any more than is connected with the subject-matter of my present observations; and when I tell you that the whole of our 250 miles ascent above the limit of former exploration was entirely through Filatah territory, you will see how observations on the peculiarities of this remarkable race of people will form a very interesting subject. I deem it may not be out of place at this part to inform you, that in our exploratory voyage we found that the Tshadda and Binuë are one and the same stream; and that from the place of the river’s confluence with the Kwarra near Odokodo,\* to the highest point of our navigation at Mount Laird, it bears four names: the Tshadda, from the confluence to Ojogo; the Lihu at Rogan Koto; the Nu at Anyashi; and the Binuë upwards from Gandiko.

The Filatahs, as they are called by the Bornuese; the Felanas, as they are entitled by the Houssa people; and the Foulahs, as they are familiarly described by one another, are a race originally descended from a mixture of Arabian and negro blood, and now carrying their sway in Central Africa to such an extent that they have several pure negro nations subservient to them, with all of whom the profession of Mahommedanism is made\* essential. Some persons say that the original Filatahs were descendants of the ancient Carthaginian race, mixed with negro blood; others that they came down from the Arabs who invaded Eastern Africa from Asia in the seventh century. The Bedouins of the desert, the Tuaricks, and the Pastoral Foulahs over Africa, are of the same descent. An idea of their extent may be gathered from *Notes of Northern Africa*, by W. B. Hodgson, published in New York, in which he writes:—“Throughout the whole extent of Nigritia or Negroland, the Foulahs undoubtedly occupy pre-eminence. They are found spread over a vast geographical region of twenty-eight to thirty degrees of longitude (1,500 miles), and of seven

\* In former descriptions of the localities up the Niger this place is entitled Addakuda; but the origin of the name shews that this is the proper way of spelling it. It is derived from three Yoruba words, “Odo”—water; “Ko,” meets; “Odo,” water.

to ten degrees of latitude (or 500 miles). They extend from the Atlantic Ocean, from the mouth of the Senegal and Senegambia on the west, to the kingdoms of Bornu and Mandara on the east; from the desert of Sahara on the north, to the mountains of Guinea or Kong on the south. This wide superficies contains an amount of square miles equal to the fourth part of Europe, and the tenth part of the immense continent of Africa;" a continent which measures north to south, from Cape Bianco to the Cape of Good Hope, 4,302 miles, and east to west, from Cape Asser to Cape Verde, 4,127 miles. Now, as this work was published in America fourteen or fifteen years back, and, as the Filatahs have since gone on grasping territory, there is no doubt of their dominion being at the present day more extensive. In Mr. Hodgson's time nothing was known, save by rumour, of the mighty kingdoms of Adamawa, Kororoofa, Bautshi, and Hamarruah, by whose banks the "Pleiad" lately passed in her exploring voyage. The only work I am aware of having been published about these people is a little volume which I saw last week in the library of the Royal Geographical Society in London, entitled *Histoire et Origine des Foulahs ou Fellans, par Gustave d'Eichthal*, which is published at the *Librairie Orientale*, 8, *Rue des Pyramides, Paris*.

When Dr. Barth was at Kano, "The London of Sudan," and at Kuka, the capital of Bornu, he received a good deal of information about the Filatah provinces, some of which was published under the editorship of Mr. Petermann, previous to the doctor's visit to Sakatu and Timbuktu. We must, however, wait till his arrival to get the most perfect history of these people ever yet given to the public. Meanwhile, we may enjoy the knowledge we have so far received from him, with the little I shall endeavour to add to it confirmatory of his discovery.

Emir El Mumenim Ali Ben Bello was at the time of our voyage up the Tshadda, the head Filatah Sultan, and resided at Sakatu. Within the limits of his own kingdom he was able to collect a force of 10,000 horse. He had twelve governors over different parts of his dominion, or different provinces, who adopt the title of Sultan as well as himself; and who, receiving their orders from Sakatu, must necessarily, with a force of 24,000 horse, their aggregate strength, and a large number of archers, hold sway over a considerable portion of the African continent. To the best of my recollection Dr. Barth does not enumerate amongst these the Sultans of Hamarruah, of Bautshi, and of Kororoofa, all of whom acknowledge allegiance to the great man at Sakatu. Under all these, too, there are subordinate chiefs of villages and districts who are

compelled to pay tribute, and are kept in perfect subservience by the strong arm of power, and by that alone. The importance of Kano, so celebrated for its metallic and cloth manufactures, may be judged from the fact of its governor sending 10,000 cowries *per diem* for the head Sultan's household at Sakatu, as revenues derived from its market customs.

I was for some time puzzled to understand whether it was the instinctive thirst for human blood, natural to man in his uncivilized state, or the urgings of ambition for extent of territory, that drove the Filatahs to a life of plunder. And I believe it to be more these causes combined than any truculent fanaticism for the propagation of the Mahommedan creed. Of the first there occurred an example in the countries bordering on the Tshadda during our late ascent. The kingdoms of Igbarra and Bassa occupy the territory reaching from the confluence to Dagbo, the limit of former exploration in Laird and Oldfield's expedition of 1833, and the commencement of the Filatah country in Doma. Some people living at Ousha, in the direction of Doma, and heretofore tributary to Adamo, king of Bassa, refused to pay him any more. To punish them Adamo invited or employed a band of Filatahs from Zaria, the capital of Zeg-Zeg, which is a province within Doma, to come down and beat the Ousha people for him. When they had done this to Adamo's content, they must have thought it was hardly worth their while to journey so far on such a trifling business, and so they picked up a quarrel with Senani, the brother of Adamo, who was governor of a place called Apata, in the Bassa country. In spite of Adamo's remonstrances, they burned Apata, and, having dispossessed Senani, actually turned upon Adamo himself to lick him for daring to curb or put a limit to their lawlessness. Thirst for blood increasing by what it fed upon, led them to make a complete subjugation of the Bassa and Igbarra kingdoms; and so they dethroned Adamo; drove him from his capital, Ikeriko, which they burned; took many of his subjects away for slaves; and, in the extremity of their truculence, went on to Pandah, which they destroyed in like manner, killing its monarch.

The absence of freemasonry in their savagery, is also evident from what has been recorded to me of the foundation of the kingdom of Zhibu (in the Kororoofa district), whose capital of the same name is situated on the left side of the Binuë, and where its present King, Saraki Tumbadee, resides. The story goes, that in times gone by, and of which chronology here gives no record as to date, a band of Filatahs made a descent from Sakatu upon Wukari, the capital of Kororoofa.

With a design to depose its governing head, and hold it in subjugation.

But he repulsed them; and hence, being ashamed to return to their own country with the stigma of defeat, they settled at Zhibu, on the confines of Kororoofa, where they have been permitted to remain on condition of paying a yearly tribute to the monarch of the latter place. Kororoofa being at the other side of the river from Sakatu, it shews likewise the fallacy of what has hitherto been supposed to be a fact, that the Filatahs had a superstition against crossing the water.

Yet in spite of this native ferocity, amongst the Filatah people of Zhibu, of Gandiko, and of Hamarruah more especially, there is an evidence of superiority both in physique, and of their position in industrial arts, far above what is seen amongst the negroes on the slave coast. The views which are alluded to in Latham's *Natural History of Man*, with reference to the "coincidence between the negro type, in the way of physical conformation, and the geographical condition of a fluvial low land," may be illustrated at every kingdom of an ascent up these streams. The Filatahs of Zhibu, who are a negro race, are subject to the Sultan of Kororoofa, who resides at its capital, Wukari, and I believe that many Moslem-professing nations of this stamp, into whom Mahomedanism has been hammered *bon gré mal gré*, are held in what one of our ancient reformers would have called a "Kakodoxy," which may be defined a mingling of Mahomedanism and Paganism, and therefore more accessible to the teachings of the true faith. Those who have read Lieutenant Burckhardt's *Travels in Syria*, may remember he has said that these tribes professing Moslemism, as the Bedouins of the desert, who do not make a pilgrimage to the shrine of the prophet at Mecca, are not so obstinate in their animosity to the "Christian dogs." And the superiority of the Filatahs up the Tshadda-Binuë is also evident from the fact of a large extent of their ground being cultivated for the growth of Indian and Dower corn, pumpkins, ochroes, and beans; from their taking care of a quantity of excellent horses of the Arabian breed; from their having large herds of cattle; from their working brass, copper, tin, and lead into fanciful ornaments; from their ingenuity in fabricating arrows, javelins, and swords; from their wearing more clothing than the natives on the coast; and from their streets and houses being cleaner. The Mallems (or learned men), who officiate as high priests, all wear Houssa tobes, generally of blue or white (as tobes of the pattern shewn here are only worn by the ruling men), that reach from the neck to the knees, and slip over the shoulders like a poncho; whilst a turban, white or blue, covers the head, one fold of it being brought across the mouth and nose, which gives its wearer a very ghostly look. Yet these men would set a very good

example to many of our lukewarm Christians at home by the solemnity and fervency of their devotions. Five times a day they turn their faces to the east, the quarter of the globe in which Mecca lies, and offer up their devotions to the prophet. Repeating passages from the Koran, kneeling down, and rubbing their foreheads to the earth, and passing through their fingers the beads of the Kumboloio,\* which are ninety-nine in number. From these Mallems the Galadimos (or Prime Ministers), are usually selected, and their titles to this distinction are generally founded on the judgment formed by the Sultan of their abilities and information on matters without the pale of their priestly duties.

Of the lady Filatahs whom we saw at Hamarruah, it would be impossible for me to speak in terms too eulogistic of the impression their appearance made upon me. As we walked from the Galadimo's house, on the morning of our conference, to the Sultan's palace, groups of them were here and there in the streets, gazing at us with a simple expression of wonderment (for they had never seen European faces before), that had not the slightest tinge of impertinent curiosity in it. The deep bronze colour of their features, the Grecian outline of countenance, on which there was a beaming expression of a suavity of trusting gentleness, combined with a tint of joyfulness, brought to my mind the beautiful expression of L. E. L., of "half-smiles born of no cause, but the very buoyancy of inward gladness." With this, their neat blue wrappers covering their whole frame, and their hair tastefully arranged, gave them a superior appearance from what African women are usually supposed to have. At Zhibu we saw some negro Filatah ladies, ornamented by having larger perforations in the cartilages of their ears, in which a piece of carved ivory, lead, or camwood was usually thrust, (I suppose as the conventionalities of the *haut ton* fluctuated in their city); and some of these had brass nails in their noses, the flat head being placed external to the ala, and the stem of the nail curved towards the ear of the same side.

The "revelling in strange and fantastic creations," which Baron Von Humboldt writes of, as existing in nations least advanced in civilization, was perceptible to us every day. Faith in fetishes and ju-jus: a belief that a scrap of paper, on which is transcribed a passage from the Koran, if sewn up in leather and suspended round the neck, will insure its wearer from harm—bestow upon a barren woman the faculty of conception—and enable a slave-hunter to make a successful foray, is the most common matter of doctrine with them. Our Houssa interpreter told me of the Yoruba people's believing that white men possessed

\* The Turkish name for the Mahomedan rosary.

ability beyond black men, from the former residing in a country where their chief condiment was rainbow dung ; and hence, of course, their superiority from feeding on what was considered to be celestial ordure. He also informed me, that in his country—and the Houssa people are a very extensive tribe of Filatahs—the chameleon always goes along at the same pace ; not quickening his steps for rain or wind, but going slow and steady in all phases of temperature. On being asked the cause of this uniformity, the chameleon replies, “ that he does so, because his father did so before him : ” the principle which is always advanced by an African on the suggestion of improvement. When I asked my informant, why the chameleon changed his colour, when he would not change his gait ? he replied he could not tell, but that when a chameleon met white men, he became white ; on meeting a black man, he turned black ; and coming near blue or red cloth, he assumed their colours respectively—statements I need not inform you that are more complimentary to the animal’s politeness, than to the facts of his natural history. The Houssa people also believe in the existence of the unicorn ; but his location cannot be pointed out. He is supposed to be the champion of the unprotected goat and sheep from the ravages of the leopard ; that when he meets a leopard he enters amicably into conversation with him, descants upon his cruelty, and winds up by depriving him of his claws. On my telling the man that no such thing as a leopard without claws has ever been found, he seemed to be quite ashamed of being convicted in “ interpreting supposed facts that have never been observed,” and ceased his narration at once.

If I am not trespassing too much on your time and attention, I will detain you a few minutes longer by alluding to a matter that, since it came under my notice, has caused me a good deal of serious thought. I do not pretend to enter into the ethnology of African races, or presume in a capacity to treat of them as Drs. Latham and Pritchard, and Mons. Froberville have done, but I wish to point out a strange fact of analogy between the African nations visited on our late voyage, and the Anglo-Saxons who inhabited our country before the Christian era.

A paper was read at the *soirée* of the Historic Society, at the close of last year’s meeting of the British Association in Liverpool, by Mr. Wright, M.A., F.S.A., upon the Faussett Antiquities—a collection made by the Rev. Bryan Faussett of Heppington, near Canterbury, and which had been gathered from the graves of our forefathers who existed in this country in a pre-Christian period. Mr. Wright observes—“ In the case of a man we almost always find above

the right shoulder the *iron head of a spear*; and in general, we may trace by the colour of the earth the decayed wood of the shaft until near the foot of the skeleton lies the *iron-spiked ferule* which terminated it at the other end. We sometimes meet with one or more *smaller heads of javelins or arrows*. Closer to the side of the skeleton lies usually a long *iron broadsword*, not much unlike the claymore of the Scottish Highlanders, of which it is probably the prototype." The very weapons of warfare that are used in the present day by the Filatahs of Central Africa—the spear with its *iron-spiked ferule*, the *javelins and arrows* of different patterns, and the *double-edged Houssa sword*, manufactured by themselves, even amongst nations that never, until our recent visit, looked on the face of an European, and could not have received instructions in armoury fabrications from any so-called civilized country. I brought specimens of each of these home with me, and presented them to Sir William Hooker for preservation in the museum at the Royal Botanic gardens of Kew.

Mr. Wright goes on:—"Another article peculiarly characteristic of the Saxon interments is the knife, the length of which is generally about five or six inches, although at times it extends from ten to eleven inches, and, from its shape, it must have been a very formidable weapon, independent of its utility for other purposes."

The Filatahs have two-edged knives of various lengths, used as weapons of self-defence as well as for useful cutting instruments. Some are carried openly in their hands; some protected by a sheath which passes under the left arm, and is fastened to the hand by a cincture of strong leather that envelopes the wrist. Besides these, they manufacture out of metals—razors, ink-bottles of brass, hair-pins for ladies out of the same material, rings for the fingers of copper, iron shovels for agriculture, spears for fishing, and armlets (brass and lead) for the exquisite of both sexes.

"It may be observed also," continues Mr. Wright, "that we sometimes find a string of beads round the neck of a man, and other circumstances show that there were Saxon exquisites who were vain enough of their personal adornments." At the Filatah city of Zhibu, seeing a number of young men decked out with beads and brass ornaments, plaited hair and rasped teeth, I enquired of one of our interpreters who these men were, when a Kruman sidled up to me, and with a knowing leer, such as only can be assumed by men of his nation, explained in this didactic manner:—"Dem be men, Sir, dat come up throng (strong) for dandy side!"

Articles of pottery are also made up the Niger, Tshadda. and

Binué, resembling those dug from Anglo-Saxon graves, and of which you may remember a description in the *Illustrated London News* of October 7th, 1854. Of these a few examples may be also seen at Kew; amongst them a pot-shaped article perforated with a number of small holes, and used for straining the water off the bodies of locusts after they have been boiled, preparatory to making them into cakes for human food. "It is remarkable also" Mr. Wright adds, "that some of these graves contain cowrie shells—articles which are found only on the shores of the Pacific,"—and equally remarkable, I may add, that in the present day cowrie shells are the chief currency throughout Central and a great part of Western Africa.

To these people and those countries, both of which are in a state of infancy, our Government owes a great practical lesson, founded upon an imperative duty. Independent of her character for unfurling the British banner as the ægis of civilization and Christianity over the world, she has still a weighty debt on her shoulders to the vast continent of Africa. I cannot be accused of any attempt at declamation in saying that the twenty millions of money spent in West Indian emancipation are little alleviation to the miseries caused by the fact of the inhuman slave traffic being legalized amongst us for nearly two centuries. The voices of humanity and religion, the glory and honour of our empire, and the practically commercial character of our country, loudly call for the aid of Government in assisting private enterprise to open the inexhaustible resources in nature's treasury along the banks of the rivers Niger, Tshadda and Binué. The idea of the native African being averse to labour is a complete fallacy. There was no fact which impressed itself on my mind so vividly during my residence in that part of the world, as the knowledge which many members of the negro race possess of the immense industrial resources of the country, with a consciousness of their own incapacity to turn these to account. And when I point to the results of our late voyage to demonstrate that the climate would not be so fatal as it has hitherto proved to European constitutions, if a proper method of prophylactic hygiene, a different mode of daily living, and another line of therapeutic practice were adopted, it will not be considered as building castles in the air for me to say, that if the Government lend a helping hand to private enterprise to open trade operations here, British influence would be extended; pillage amongst the Filatahs would cease; with its cessation would flow into Central Africa all those blessings of civilization which otherwise centuries cannot produce; and the industrial resources of the country will at length become developed, to the



peace and comfort of its inhabitants, and to the commercial prosperity of Great Britain."

The thanks of the Society were given to Mr. Hutchinson.

A Paper "*On Ice Impediments to Australian Voyages*,"\* was read by J. T. Towson, Esq., and the following communication was made to the Society :—

## ON CERTAIN NEW OR RARE PRODUCTS OF THE VEGETABLE KINGDOM,

By T. C. ARCHER, Esq.

IN the very short period which has elapsed since economic science first excited the attention of scientific men, an extraordinary amount of information has been collected, and innumerable errors exposed. Still, however, our knowledge of the materials of utility, yielded by the three kingdoms of nature, is in its infancy, and offers a tempting field for the student. Science to be useful must be practical, and unless it can teach us to use those materials which nature offers to our hand, or to search for those which are of more difficult attainment, it becomes a mere amusement, the value of which is but little, if any greater than the more ordinary means of recreation.

The credit of commencing a well-defined and systematic study of economic products, as a branch of science, is undoubtedly due to Sir Henry De la Beche, whose rudimentary effort in Craig's Court was the origin of the magnificent Museum of Practical Geology, in Jermyn-street, now one of the most useful scientific establishments in the world. Since then, economic botany and economic zoology have been added to economic geology and mineralogy, and their value, as useful branches of learning, fully recognized.

The first specimens I shall introduce to your notice are three detersive materials, which are of no value in this country, but have been introduced for experiment only: 1. Origera. 2. Jaruncullos. 3. Gogo or Go-goo. The first is a curious legume, the dorsal suture of which is much contracted and curled round; and the valves are at least an inch broad; the ventral suture has a waved outline. This legume is the produce of *Enterolobium timbouva* (Natural Order *Leguminosæ*); it is used by the natives of New Grenada, and other parts of South America.

\* The author has communicated to the Secretary, that believing that this paper on Ice-impediments, &c., will be principally valuable to the nautical man, he prefers its being published in the *Mercantile Marine Magazine*."

as soap, and raises a considerable lather with cold water. The second, used for similar purposes, also from New Grenada, is the dried berry of *Sapindus saponaria* (Natural Order *Sapindaceæ*). The third is the fibrous bark of a tree, the name of which is at present unknown in Manilla; probably it is *Mimosa abstergens*; it bears the name of Go-go, and is very likely the same material as that mentioned by Dr. Royle, under the name of Go-goo, one of the fibrous substances of India. It forms a profuse lather with water, and is much esteemed by the ladies of Manilla for cleaning their hair, which is usually of great beauty and luxuriance.

The next series to which I shall call your attention is one consisting of five cryptogamic plants, one fungus, two lichens, and two algæ. The first is a fungus, which, under a native name, whose signification is mouse-ears, forms an article of food amongst the superior classes of China and Manilla: the Chinese obtain it from the latter place. It is *Exidia auricula-juda*. Next in turn, I have two lichens which, though not new, are rare in this port. They are used in manufacturing the beautiful purple dye called archil. The first is *Rocella fuciformis*, or Madeira orchella, from Madeira. The second is *Lecanora tartarea*, or the rock moss of the dyers; it is imported from Lisbon, and is probably collected on the Cape de Verde Islands.

The two algæ are interesting in consequence of various discussions to which they have given rise amongst the pharmacologists; they also afford a particular illustration of what I remarked concerning the difficulties in the way of verifying statements respecting the origin and identity of economic products. Thus Pereira, Royle, and others, have described agal-agal under the names of *Plocaria candida* and *Ceylon moss*; Dr. O'Shaughnessy and others have called it a *Fucus* (*F. spinosus*); and very various analyses have been given,—some of the formulæ indicating a plant containing an abundance of jelly, and no appreciable amount of starch; others, on the contrary, exhibiting an enormous proportion of starch, and no jelly. I have, however, been able to prove that the native names, agal-agal, agar-agar, agar-carang, and the commercial name, Ceylon moss, are applied to two fuci, each possessing peculiar characters.

Thus, the true agar-agar, or agal-agal, is *Fucus spinosus*, and contains probably more jelly than any known plant. So great is the quantity that it is often washed to remove the salt, then soaked until it becomes much swollen, and afterwards preserved in sugar as a sweetmeat. The agar, or agal carang, Ceylon moss, is *Plocaria candida*, a fucus of very different character, having terete branches free from the

peculiar nodose spines of the former ; its cells yield very little jelly and an abundance of starch,—both are used in this country for dressing silk fabrics. They are imported from Ceylon and Singapore. In China they are very extensively used as food ; and it has been asserted that the edible bird's nest is principally composed of these fuci. This, however probable, requires confirmation.

A curious nut has lately made its appearance in our markets under the name of “the little coker nut.” It is the fruit of a South American palm, called *Jubaea spectabilis* ; the edible part consists of a thin albuminous layer adherent to the endocarp—the flavour resembles that of the cocoa nut.

My next specimen is one of a vegetable fat, now largely imported from Singapore under the name of Vegetable Tallow,—a term calculated to mislead, because another vegetable fat is entitled by priority to this name. The substance before me has been known for centuries in India as oil of cokum, or kokum oil, and differs very materially from the fat of *Croton sebiferum*, which has been called vegetable tallow, and contains a peculiar principle known as crotonic acid, which is absent in cokum oil. It is used for admixture with animal tallow, and is obtained by boiling the fruit of *Garcinia purpurea*,—a plant of the natural order *Clusiaceae*, and of the same genus as the delicious Mangosteen.

From India we have lately received a considerable quantity of Salep in small consignments, and there is a growing demand for this article, not, however, I think, with a view of restoring the *saloop* establishments which used to occupy the corners of the London streets, but for the purpose of adulterating another diet drink. It is not from India alone that we may now look for a supply of salep : the specimen I have here was sent to me from Germany by my friend Dr. Martius, professor of Pharmacognosie in the University of Erlangen. It is collected in the neighbourhood of Wertheim, and consists of the tubers of *Orchis morio* and *Orchis mascula*. The varieties of salep procured in India are from different orchidaceous plants, which are largely sold in the bazaars under the names of *Saleb misree*, and *Salep*, or *Saleb hindre*. The supposed aphrodisiac properties of these roots, and the beverage made from them, has rendered them of considerable importance in the enervating climates of the East. I have until lately been much at a loss to account for the growing demand for salep in this country, but having traced a quantity to a chocolate manufacturer, I have now no doubt that it is used in the manufacture of that article, for which it is well adapted.

This brings me to another product which is eagerly sought for by

the chocolate-maker. It is called the Sassafras Nut, but is really the cotyledon of a large seed—not of the sassafras tree, but of *Nectandra puchury*, a *lauraceous* plant, which has a flavour of sassafras and vanilla, and is much esteemed by chocolate drinkers.

Another of the errors in our works on pharmacy has been in placing the *Costus* of the ancients amongst the *endogens* in the natural order *Zingiberaceæ*. This fragrant root is proved by Dr. Falconer to be the produce of a *composite* plant—*Aucklandia costus*, a native of Cashmere and other parts of Asia. In Cashmere it is always used for protecting the valuable shawls from moths, being little esteemed as a drug. In India, however, it is highly prized as a tonic, stimulant, and aphrodisiac medicine.

I have here the seeds of a grass which is occasionally imported into Liverpool, and has probably been seen by many present, but, as it may be new to some, I thought it worth showing. It is the *Darra* or *Darri* of the Arabs and Turks: the seed, or fruit more properly speaking, of *Andropogon sorghum*, called *joar* in India, where also it is used extensively.

By eastern nations it is employed as food, and in this country for feeding domestic animals. It has been naturalised in the United States. The corn is much used by the slave population, and the hard dry stems constitute a very important article of commerce, under the name of broom corn: they are largely manufactured into carpet brooms, whisks, &c.

I have only one other product to show you, it is the elegant seed of the *Eleocarpus ganitrus* (natural order *Tiliaceæ*), which, in India, is made into rosaries and necklaces, called Brahmins' Beads; these seeds appear beautifully carved, and are often mounted in silver and gold. They are interesting in another point of view as illustrating the use of the rosary in religious worship, seeing it is asserted that their use is synchronous with the institution of the worship of Brahma.

Thus closed the public meetings of the Society.

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# ADDITIONAL NOTES TO THE PAPER ON SURNAMES.

By REV. A. RAMSEY, M.A.

THE introduction into the text of matter originally intended for foot notes—a change effected for pecuniary considerations—although skilfully managed by the Editor, has unavoidably given, occasionally, an involved appearance to the style. The author appends the following notes in addition to those already given:—

Page 26, line 38. MOSES. Josephus's interpretation of this word is *ὁ ἑκαστὸς σωτὴς*. Pott, however (see *Pott's Personen*, pp. 18, 21, 27), renders it, "The Drawer out" or "Saviour," and according to him, Darius or Darab has, in the Persian language, precisely the same meaning.

Page 29, line 1. On this tendency of the English to abbreviation, Addison has a very instructive paper in *The Spectator* (No. 135). He instances the fact, that whilst the Italians lengthen the name Nicholas into Nicolini, we shorten it into Nick. A better instance may be found in the name Jacob, which we curtail into James, and the Italians elongate into Iachimo [Giacomo—ED.]

Page 31, line 13. I am aware that there are those who consider that both the Saxon "ing," and the Russian "vich" and "off," to be mere adjectival terminations, and assert that "Petr Alexandrovich" and "Anna Alexandrowna," are but abbreviations of "Petr suin Alexandrovich," i.e. "Peter the Alexandrine son," and of "Anna doch Alexandrovna," i.e. "Anna the Alexandrine daughter." I think, however, the analogies I have adduced are sufficient to disprove this view of the case.

Page 39, line 32. My readers may consult "*Nare's Heraldic Anomalies*," vol. i. p. 175, for some curious information and anecdotes relative to names of this class.

## ERRATA.

Owing to absence on the Continent while this paper was passing through the press, the following errors have crept in:—

At p. 25, l. 4 from bottom, for *called* read call; p. 28, l. 5, for *Ibu* read Ibn; l. 10, for *Regenes* read Theagenes; l. 14, for *Marcopor* read Marcipor; and for *Lucu* read Luci; l. 15, for *Marcu* read Marci; p. 29, l. 30, for *Gnogarach* read Griogarach; l. 33, for *Mc* read Nic; l. 38, for *Seefing* read Scaffing; l. 41, for "o" "ing," "ock," "okin," read "ing," "ock," and "kin." At p. 30, l. 24, for *dalter* read datter; l. 33, for *Polt.* read Pott; l. 40, for *Polt. Etym. Tors.* read Pott, Etymologische Forsch. At p. 32, l. 16, for *Tronto* read Fronto; l. 17, for *Labrenus* read Labienus; and last line, for *Metas* read Melas. At p. 33, l. 1, for *Tuscu* read Fuscus; l. 5, before the Greek word insert comp.; l. 6, for *Morean*, *Mosell* read Moreau, Morell; l. 25, for *Ruddeman* read Ruddimann; p. 36, l. 2, for *Hillier* read Hellier; p. 38, l. 18, for *Allen-ash* read Atten-ash; l. 19, for *Allen-eye* read Atten-eye; and at p. 41, l. 27, for *Jason* read Juxon.

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ON THE HUMAN HAIR; *from Mr. Rowland.*

THE RIGHTS AND JURISDICTION OF THE COUNTY PALATINE OF CHESTER, by Joseph B. Yates, Esq., F.S.A; *from the Author.*

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HISTORY AND DESCRIPTION OF THE BARBERINI OR PORTLAND VASE, by James Boardman, Esq.; *from the Author.*

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APPENDIX I.

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ON THE

MUSCI AND HYPATICÆ

FOUND WITHIN TWELVE MILES OF

LIVERPOOL AND SOUTHPORT..

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BY

FREDERICK P. MARRAT.

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[READ BEFORE THE SOCIETY ON THE 30th APRIL, 1855.]



## NOTE.

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In preparing a list of the Mosses, so short a time after the publication of the "Flora of Liverpool," by Dr. Dickinson, some explanation appears necessary.

At the close of the year 1851, the number of species known to our local collectors was 114; and at the end of the year 1854, the species numbered 170—showing an increase of 56, or nearly one half of the original number.

Among these will be found three new British species, two of which are new to the science, (*Bryum cochlearifolium* and *Bryum Marratii*), and the third (*Bryum calophyllum*) was enveloped in considerable obscurity on account of the ambiguous descriptions, and the want of good fruiting specimens for examination. If we add the following rarities, *Hypnum elodes*, *polygamum* or *nodiflorum*, *scorpioides*, *piliferum*, *resupinatum*, *pratense*, *caspitosum*, *elegans*, *salebrosum*, *Kneiffi*, *pumilum*; *Omalia trichomanoides*; *Meesia uliginosa*; *Leskea polycarpa*; *Compylopus terfagus*; *Splachnum ampullaceum*; *Orthotrichum tenellum*, *phyllanthum*, &c., it will be found that our list is equal in interest to any hitherto published, and vastly superior to most.

My thanks are due to those gentlemen who have contributed to this paper. Mr. Harrison and Mr. Fisher have each furnished me with a list of localities, and some interesting additional species.

Dr. Dickinson, with his usual urbanity, has greatly assisted me by lending books, &c., from his extensive and very valuable library, without which my operations would have been materially diminished and my progress retarded.

William Wilson, Esq., of Warrington, has been the principal means of our receiving such an extraordinary increase to the list; his able assistance has been given on a great many occasions where uncertainty would otherwise have caused the specimens to have been thrown aside.

Mr. Tudor, of Bootle, whose love of Natural History, and particularly of Botany, has led him to investigate some of the most important facts connected with the science, has always been of great service. Mr. Sansom and Mr. Shepherd must not be omitted.

# INTRODUCTION.

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## I. INFLORESCENCE.

As the study of this portion of Cryptogamic Botany has been almost entirely neglected by some of our local students, it will perhaps be useful to explain the method of investigation in some of the species belonging to different genera. That mosses flower, there now appears to be little doubt; also that the organs called *archegonia* and *antheridea* are analagous to the stamens and pistils of cotyledonous (flowering) plants,—the spermatozoids acting in a similar way to the pollen, although no botanist has yet been able to discover the spermatozoids entering the tube of the archegonia. When we consider the extreme minuteness of these bodies, which require the aid of the best microscopes to discover even their form, this circumstance is easily explained.

Examining some plants of *Bryum cernuum*, a synoicous species, abundant on the shore at Southport, in September last, my attention was attracted by the red appearance of the tops of some of the stems, and these I dissected under my simple microscope, an instrument indispensable to the practical bryologist. The method adopted was the following:—having washed the moss clean, I dropped some water into the centre of the glass, fixed firmly in the brass ring of the instrument, and with a pair of glover's triangular needles, placed in crochet handles, with a screw on the end, forming the cheapest and the best instrument that can be employed, I commenced operations on the plant. On removing the perigonal leaves for the purpose of examining the centre, there appeared two very differently shaped organs, the one bag-shaped, the other long and narrow, having, when considerably magnified, a flask-shaped mouth, with a hollow tube communicating with the centre—this is the *Archegonia*, or portion of the plant destined to form the reproductive organs, (such as the seta and theca, with its operculum and calyptra), and to ripen the spores contained in the urn-shaped capsule. Some species are provided with an elastic band or ring surrounding the mouth of the peristome and called an annulus, which separates the operculum from the capsule when the seed is mature; the office of the

## INTRODUCTION.

teeth being to distribute the spores, an operation which may sometimes be seen under the microscope. To the other organ the name of archegonia has been applied: it is filled with the spermatozoids, which are amongst the most wonderful and interesting productions in the vegetable kingdom. One of these burst when under the microscope, the whole band, as if suddenly relieved, came twirling along with great rapidity, forming all manner of groups; after a time some of these burst the thin case that encloses each separate spermatozoid, and then came a number of snake-like creatures, with a round protuberance in or near the centre, curling and gyrating most curiously, and this was continued for several hours. They were observed under one of Pillischer's compound microscopes, with the quarter object-glass and the lowest eyepiece.

In the *Hypnum*, the inflorescence is enclosed in the perigonal leaves, situated on the sides of the stems and sometimes on the branches, like small dark buds or clusters of leaves, not difficult to recognise, generally nestling among the leaves. In the genus *Orthotrichum* the antheridæ are jointed; and in one species, *O. phyllanthum*, found only in a barren state, they are situated on the apex of the leaf.

## II. DISTRIBUTION.

THE basins formed in the sandhills on both sides of the Mersey are peculiarly favourable to the growth of Mosses. They appear almost naturally formed for the reception of the floating spores of this minute class of plants. In winter these basins are partially filled with water, which evaporates in the summer, and the decaying leaves of the *Salix fusca* and the *Rosa spinosissima*, &c., together with the entangled and closely matted growth of some of the species of Moss, form what might be termed peat bogs in miniature.

The plants found from Crosby to Southport, on the river side of the railway, are the following:—*Mnium stellare*, *cuspidatum*, *serratum*; *Meesia uliginosa*; *Amblyodon dealbatus*; *Tortula ruralis*, *subulata*, and *unguiculata*; *Climacium dendroides*; *Bryum serratum*, *inclinatum*; *Hypnum elodes*, *lycopodioides*, *revolvens*, *molluscum*, *polygamum* or *nodiflorum*, *confertum* var. *megapolitanum*, *stellatum*, *Kneiffii* *fluitans*, *cuspidatum*, *cupressiforme* var. *nigro-viride*, *cordifolium*, *albicans*, *lutescens*, *filicinum*, and *serpens*. Many species occur on walls and exposed rocky situations, while others attach themselves to the bark on the trunks of trees; some are found on moist clay banks, and a few in  
v and marshy places; one plant grows where it is exposed

## INTRODUCTION.

to inundations of fresh water, and many are found on the sea shore where the tide occasionally washes over them; but few adapt themselves to any soil or situation.

Those found on the sea shore from Southport to Churchtown are :—*Bryum calophyllum*, *Marratii*, *Warneum*, *intermedium*, *cernuum*, *pal-lens*, *atropurpureum* var. *Funkii*; *Hypnum Kneiffii*, *stellatum*, *polyga-num*, *serpens*, *elodes*, *cuspidatum*; *Ceratodon purpureus*; *Tricho-stomum tophacium*, &c.

Those found on the wall in Smithdown-lane, from the end of Ullet-lane to the end of the wall beyond Greenbank-lane, are :—*Grimmia pulvinata*; *Ptychomitrium*, *polyphyllum*; *Racomitrium fasciculare*, *heterostichum*; *Hypnum cupressiforme*, *velutinum*, and *rutabulum*; *Funaria hygrometrica*; *Bryum capillare*, *cæspiticium*, and *intermedium*; *Tartula murale*; *Didymodon rubellus*; and *Weissia cirrhata*.

Those found on the river bank from New Ferry to Bromboro Pool are : *Hypnum molluscum*, *stellatum* and var. *minus*, *striatum*, *cuspidatum*, *filicinum*, *purum*, *triquetrum*, *squarrosum*, *tamariscinum*, *denticu-latum*, *elegans*, *rutabulum*, *splendens*, *prælongum*, and *cupressiforme*; *Fissidens bryoides*, *viridulus*, *taxifolium*, and *exilis*; *Tortula aloides*, *unguiculata*, and *fallax*; *Bryum carneum*; *Mnium cuspidatum*, and *undulatum*; *Dicranum varium*, *rufescens*, and *heteromallum*; and *Atrichum undulatum*.

And the plants found on Bidston Moss are :—*Aulacomnion palustre*; *Dicranum cerviculatum*, *pellucidum*, *heteromallum*; *Bryum pseudotriquetrum*, *carneum*; *Hypnum salebrosum*, *fluitans*, *cordi-folium*, *commutatum*, *cuspidatum*, and *rutabulum*.

MUSCI OF LIVERPOOL.

3. *P. CUSPIDATUM*. Schreb. (Pointed E.) Wils. T. 5.

On hedge banks common. The commonest in this genus.

VAR. *PILIFERUM*.

In similar situations. Not so common as the preceding. Both fruiting in February and March.

4. *P. NITIDUM*. Hed. (Delicate E.) Wils. T. 5.

Not uncommon on hedge banks near St. Helens. Fruiting in March.—*Rev. H. H. Higgins and Mr. F. P. Marrat*. Botanic Garden.—*W. Skellon*.

5. *P. SUBULATUM*. Lin. (Awl-leaved E.) Wils. T. 5.

Moist, clayey, or heathy ground, not uncommon. Fruiting in spring. Bebington heath, on a bank by the road side.

6. *P. ALTERNIFOLIUM*. Br. and Sch. (Long-leaved E.) Wils. T. 37.

On a hedge bank on the left-hand side of the private road from Rock Ferry to Storeton. Fruiting in March, and very fine about 40 yards beyond the brook.

7. *P. CRISPUM*. Hed. (Curly-leaved E.) Wils. T. 5.

Near the Old Abbey at Windle.—*W.S.* This requires confirmation.

SUB-ORDER II.—WEISSIEÆ.

*Genus IV.—GYMNOSTOMUM*. Hedwig. *Beardless Moss*.

1. *G. MICROSTOMUM*. Hed. (Small-mouthed B.) Wils. T. 7.

On clay banks occasionally.—*W. S.* About Gillbrook, frequent. Fruiting in Spring.

*Genus V.—WEISSIA*. Hedwig.

1. *W. CONTROVERSA*. Hed. (Green-tufted W.) Wils. T. 15.

Hedge banks, walls, &c., very common. Fruiting in Winter.

2. *W. CIRRHATA*. Hed. (Bent-leaved W.) Wils. T. 15.

On walls not uncommon. Fruiting in February and March. Smith-down-lane.

SUB-ORDER III.—DICRANEÆ.

*Genus VI.—DICRANUM*. Hedwig. *Fork Moss*.

1. *D. PELLUCIDUM*. Hed. (Transparent F.) Wils. T. 17.

Bidston Moss, by the side of the ditch near the first gate. Not fruiting. October, 1854.

2. *D. SQUARROSUM*. Schrad. (Drooping-leaved F.) Wils. T. 17.

A friend of Mr. Harrison's found this species near the lighthouse at Bidston. A very likely locality, but requires confirmation.

3. *D. CRISPUM*. Hed. (Curl-leaved F.) Wils. T. 17.

In the old quarry at Wavertree. Fruiting in October.

4. *D. VARIUM*. Hed. (Variable F.) Wils. T. 17.

Damp clay banks, common. On the river bank beyond New Ferry. Fruiting in January.

## MUSCI OF LIVERPOOL.

5. *D. RUFESCENS*. Turn. (Reddish F.) Wils. T. 17.  
In situations similar to the last, but not so common.
6. *D. CERVICULATUM*. Hed. (Spur-necked F.) Wils. T. 16.  
On all the bogs in the neighbourhood, most abundant. In the quarries at Greenbank and Wavertree, very fine. Railway-bank, Broad Green.—*W. H.*
7. *D. SUBULATUM*. Hed. (Awl-leaved F.) Wils. T. 18.  
On a bank near Eastham Stone Quarry. Fruiting in October.
8. *D. HETEROMALLUM*. Hed. (Silky-leaved F.) Wils. T. 18.  
Banks, quarries, &c. very common. Fruiting nearly all the year.
9. *D. SCOPARIUM*. Hed. (Broom F.) Wils. T. 18.  
Heathy ground common. Fruiting on the left-hand side of the road leading to Speke Hall, about 50 yards after passing the green gates, in February, 1855.
10. *D. PALUSTRE*. Brid. (Marsh F.) Wils. T. 18.  
In some fir woods on the west side of Simmon's Wood moss. Scarce.—*W. H.* Knowsley Park, Higher Bebington, &c.

### *Genus VII.—LEUCOBRYUM. Hampe. Fork Moss.*

1. *L. GLAUCUM*. Hampe. (White-leaved F.) Wils. T. 16.  
Common on moist heaths, such as Bidston, Eastham Wood, &c. Always barren.

### *Genus VIII.—CERATODON. Bridel. Fork Moss.*

1. *C. PURPUREUS*. Brid. (Purple F.) Wils. T. 20.  
Old walls, quarries, and waste ground, very common. Fruiting from March to June.

## SUB-ORDER IV.—CAMPYLOPODEÆ.

### *Genus IX.—CAMPYLOPUS. Bridel. Swan-necked Moss.*

1. *C. TORFACEUS*. Br. and Sch. (Dwarf S.) Wils. T. 40.  
In the first fir plantation on the road from Higher Bebington to Tranmere, on the right-hand side.—*H. Fisher.* In the quarry by the side of the plantation.—*F. P. Murrat.*
2. *C. FLEXUOSUM*. Dill. (Rusty S.) Wils. T. 16.  
Not uncommon on heathy and marshy ground. Bidston, &c. Simmon's Wood Moss.—*W. H.*

## SUB-ORDER V.—POTTIÆ.

### *Genus X.—POTTIA. Ehrhart.*

1. *P. MINUTULA*. Br. and Sch. (Dwarf P.) Wils. T. 7.  
In fields at Gillbrook, December, 1854. Barnston, March, 1853, on an hedge bank by the road side, about 100 yards beyond the bridge crossing Bromboro' Pool on the Chester road, on the left-hand side.

# MUSCI OF LIVERPOOL.

2. *P. TRUNCATULA*. Br. and Sch. (Common P.) Wils. T. 7.  
Very common on damp clay banks. Fruiting from December to March.  
VAR. MAJOR. Wils. T. 7.  
In similar situations with the last, equally common.
3. *P. HEIMII*. Br. and Sch. (Lance-leaved P.) Wils. T. 7.  
On the sandy shore at Southport. Growing round Mr. Bewley's fish pond at Poolton. Fruiting in April and May. Plentiful on hedge banks about Leasowe.—*Rev. H.H. Higgins and F.P. Murrell*.

## SUB-ORDER VI.—TRICHOSTOMEÆ.

### *Genus XI.—DISTICHUM*. Bruch and Schimper.

1. *D. CAPILLACEUM*. Br. and Sch. (Fine-leaved D.) Wils. T. 20.  
On Rainford Moss.—*W. Skellon*. Rare.

### *Genus XII.—DIDYMODON*. Bruch and Schimper.

1. *D. RUBELLUS*. Br. and Sch. (Reddish D.) Wils. T. 14.  
On walls and sand hills, frequent. Fruiting the greater part of the year.

### *Genus XIII.—TRICHOSTOMUM*. Bruch and Schimper.

1. *T. TOPHACEUM*. Brid. (Bluntish-leaved T.) Wils. T. 20.  
On small hilly banks on the right-hand side of the first lane past the quarry at Greenbank, February, 1855. Fruiting and plentiful. Southport.
2. *T. RIGIDULUM*. Smith. (Rigid-leaved T.) Wils. T. 20.  
Near Garston.—*W. H.* Southport.
3. *T. FLEXICAULE*. Br. and Sch. (Wavy-stemmed T.) Wils. T. 42.  
On the sand hills in several places. Southport.
4. *T. HOMOMALLUM*. Br. and Sch. (Curved-leaved T.) Wils. T. 20.  
Patrick-wood, Eastham Stone-quarry. Fruiting in August.

### *Genus XIV.—TORTULA*. Schreber. *Screw Moss*.

1. *T. AMBIGUA*. Br. and Sch. (Taller rigid S.) Wils. T. 42.  
On walls occasionally. On the wall on the right-hand side going into Garston from Aigburth, about fifty yards from the village.
2. *T. ALOIDES*. Br. and Sch. (Aloe-leaved S.) Wils. T. 42.  
On clay banks not uncommon. Bank beyond New Ferry. Fruiting in February and March.
3. *T. UNGUICULATA*. Hed. (Bird's-claw S.) Wils. T. 12.  
Moist banks and walls. Common. Fruiting January and February.
4. *T. FALLAX*. Hed. (Fallacious S.) Wils. T. 12.  
In situations similar to the last. More common. Fruiting in December, January, and February.
5. *T. TORTUOSA*. Web. and Mohr. (Curly-leaved S.) Wils. T. 12.  
On the sandhills between New Brighton and Wallasey, frequent.—*W. H.*

# MUSCI OF LIVERPOOL.

6. *T. REVOLUTA*. Schwaegr. (Revolute-leaved S.) Wils. T. 12.  
On walls about Childwall and Bidston.—*W. H.*
7. *T. CONVOLUTA*. Hed. (Convolute S.) Wils. T. 12.  
In fields at Gillbrook, and near Southport.
8. *T. MURALIS*. Timm. (Wall S.) Wils. T. 12.  
On every old wall. Extremely common. Fruiting nearly all the year.
9. *T. SUBULATA*. Brid. (Awl-leaved S.) Wils. T. 12.  
On the sand hills, abundant. On hedge banks near the sea, common.
10. *T. RURALIS*. Hed. (Great hairy S.) Wils. T. 12.  
Covers the tops of the sand hills on both sides of the Mersey.

## SUB-ORDER VII.—ENCALYPTEÆ.

*Genus* XV.—ENCALYPTA. Schreber. *Extinguisher Moss.*

1. *E. STREPTOCARPA*. Hed. (Spiral-fruited E.)  
Among the sand hills on both sides of the Mersey. First found by  
*W. Skellon*. Does not fruit here.

## SUB-ORDER VIII.—CRIMMIEÆ.

*Genus* XVI.—SCHISTIDIUM. Bruch and Schimper.

1. *S. APOCARPUM*. Br. and Sch. (Sessile S.) Wils. T. 13.  
On walls occasionally. Not common. Clegg's Wood, Allerton.—  
*W. H.* Near Aigburth. West Kirby. Between Brimstige and  
Thornton, on a large stone.
2. *S. MARITIMUM*. Br. and Sch. (Sea-side sessile S.) Wils. T. 13.  
On walls about Eastham, Garston, Wavertree, West Kirby, and  
Aintree. Fruiting in February and March. Much more frequent  
than the last.

*Genus* XVII.—GRIMMIA. Ehrhart.

1. *G. PULVINATA*. Smith. (Grey-cushion G.) Wils. T. 13.  
Very common on old walls. Plentiful on the wall in Smithdown-lane.
2. *G. TRICHOPHYLLA*. Grev. (Hair-pointed G.) Wils. T. 32.  
Not uncommon on the walls about Aigburth and Garston, in a barren  
state.
3. *G. DONNIANA*. Smith. (Doni's G.) Wils. T. 13.  
On walls about West Kirby and Eastham. A small patch on a wall  
near the footpath leading from Mosley Vale to Allerton. Fruiting  
in March.

*Genus* XVIII.—RACOMITRIUM. Bruch and Schimper. *Fringe Moss.*

1. *R. FASCICULARE*. Brid. (Green mountain F.) Wils. T. 19.  
Wall tops about Allerton.—*W. H.* Smithdown-lane, opposite the  
Brook House. Associated with *Ptychomitrium polyphyllum*,  
*Tortula murale*, *Didymodon rubellus*, *Weissia cirrhata*, *Ceratodon*  
*purpureus*, &c.



2. *R. HETEROSTICHUM*. Brid. (Bristly mountain F.) Wils. T. 19.  
On wall tops about Aigburth, Smithdown-lane, &c. Common.
  3. *R. LANUGINOSUM*. Brid. (Wooly F.) Wils. T. 19.  
On some swampy ground near Thurston. — *W. Skellon*. Frequent on the elevated land on the Cheshire side of the Dee. — *W. H.*
  4. *R. CANESCENS*. Brid. (Hoary F.) Wils. T. 19.  
On the wall surrounding Oak-vale nursery. — *W. H.* Bidston Hill, very abundant, clothing the otherwise barren rocks at the side of the broad path facing Wallasey Pool. Fruiting in March and April.
- VAR. *ERICOIDES*.  
In similar situations.

### SUB-ORDER IX.—PTYCHOMITRIÆ.

*Genus* XIX.—PTYCHOMITRIUM. Bruch and Schimper. *Fringe Moss*.

1. *P. POLYPHYLLUM*. Br. and Sch. (Many-leaved F.) Wils. T. 19.  
On old walls, rather common. Fruiting in March and April.

### SUB-ORDER X.—ORTHOTRICHÆ.

*Genus* XX.—ORTHOTRICHUM. *Bristle Moss*.

1. *O. TENELLUM*. Bruch. (Slender-fruited B.)  
On an oak tree on the left bank of the Ellesmere canal, Aug. 1852, had done fruiting. I should be glad to hear of this having been found in other localities in this neighbourhood.
2. *O. AFFINE*. Schrad. (Common wood B.) Wils. T. 21.  
Clegg's Woods, Allerton. — *W. H.* On a tree on the left-hand side of the road from Warbrick Moor to the railway bridge, near a pond. On an hawthorn, near Speke. On trees about Prenton, Cheshire.
3. *O. DIAPHANUM*. Schrad. (White-tipped B.) Wils. T. 21.  
On a stone near the last gate before entering Eastham Village from the ferry, on the right-hand side. Near Bold Hall, on fallen trees. — *Rev. H. H. Higgins*. Bromboro' Woods. Bebington Woods. — *H. F.* Fruiting in April.
4. *O. CRISPUM*. Hed. (Curled B.) Wils. T. 21.  
On poplar trees in the wood opposite Mr. Willis's park wall, Rainhill. — *Rev. H. H. Higgins and Mr. F. P. Marrat*.
5. *O. BRUCHII*. Brid. (Tawny-fruited B.) Wils. T. 45.  
On oak trees in Bromboro' Wood, August, 1854, fruiting. In Eastham Wood on ditto, fruiting in September and October, very sparingly.
6. *O. PHYLLANTHUM*. Br. and Sch. (Frizzled B.) Wils. T. 46.  
On some oak trees on the left-hand side of the private road from Rock Ferry to Storeton, about 100 yards past the wood, January 1855.

MUSCI OF LIVERPOOL.

SUB-ORDER XI.—TETRAPHIDEÆ.

*Genus XXI.—TETRAPHIS.* Hedwig. *Four-toothed Moss.*

1. *T. PELLUCIDA.* Hed. (Pellucid F.) Wils. T. 8.

Flaybrick Hill.—*T. Sansom.* Plentiful on heaps of rubbish at Bidston Hill.—*H. F.* Most abundant in Knowsley and Bold Parks, Rainford Moss, &c., December, 1856.—*Rev. H. H. Higgins and Mr. F. P. Marrat.*

SUB-ORDER XII.—POLYTRICHEÆ.

*Genus XXII.—ATRICHUM.* Palisot de Beauvois. *Hair Moss.*

1. *A. UNDULATUM.* P. Beauv. (Wavy-leaved H.) Wils. T. 10.

Old quarries and moist shady places, common. Fruiting from December to February.

*Genus XXIII.—POGONATUM.* Palisot de Beauvois. *Hair Moss.*

1. *P. NANUM.* Brid. (Dwarf H.) Wils. T. 11.

Plentiful. Wavertree, Eastham, and Storeton Quarries. Fruiting in December.

2. *P. ALOIDES.* Brid. (Aloe-leaved H.) Wils. T. 11.

In similar situations with the last. Common. Fruiting from December to April.

3. *P. URNIGERUM.* Brid. (Urn-fruited H.) Wils. T. 11.

Quarries on heathy ground, not uncommon. Fruiting from December to April.

*Genus XXIV.—POLYTRICHUM.* Bridel. *Hair Moss.*

1. *P. GRACILE.* Menzies. (Slender H.) Wils. T. 46.

Rainford and Bidston Mosses.—*T. Sansom.* On a heath about two miles from Eastham.

2. *P. COMMUNE.* Linn. (Common H.) Wils. T. 10.

Marshy and heathy places, common.

3. *P. JUNIPERINUM.* Hed. (Juniper-leaved H.) Wils. T. 10.

On bogs occasionally.—*W. H.* Flaybrick Hill, Knowsley and Rainford Mosses.—*T. Sansom.* On the wall of Professor Nuttall's garden, Rainhill.—*Rev. H. H. Higgins.* About Eastham and Higher Bebington, plentiful.

4. *P. PILIFERUM.* Schreb. (Bristle-pointed H.) Wils. T. 10.

Upton, Cheshire.—*T. Sansom.* Rainhill.—*Rev. H. H. Higgins.* Storeton, Southport.

SUB-ORDER XIII.—BRYEÆ.

*Genus XXV.—AULACOMNION.* Schwaegrichen. *Thread Moss.*

1. *A. PALUSTRE.* Schwaegr. (Marsh T.) Wils. T. 28.

On most of the Mosses around Liverpool. Bidston Moss.

2. A. ANDROGYNUM. Schwaegr. (Bud-headed T.) Wils. T. 29.  
Shady hedge banks near Bootle.—*W. S. Lodge-lane, Walton.—H. F.*

Genus XXVI.—LEPTOBRYUM.

1. L. PYRIFORME. Hed. (Golden T.) Wils. T. 28.  
On pots in green-houses.—*W. S. Formby.—Rev. H. H. Higgins.*  
Sparingly on Bidston Moss. Plentiful on the brow of the hill below Higher Bebington, on the old road leading thereto from Rock Ferry. Capsules fully formed but green in June.—*F. P. Marrat.*

Genus XXVII.—BRYUM. *Thread Moss.*

1. B. NUTANS. Schreb. (Silky-pendulous T.) Wils. T. 29.  
On the Mosses common; and in the crevices of rocks and rocky hedge banks, occasionally.
2. B. ANNOTINUM. Hed. (Pale-fruited T.) Wils. T. 47.  
In quarries about Liverpool, frequent. Often overlooked on account of it seldom fruiting.
3. B. CARNEUM. Linn. (Pink-fruited T.) Wils. T. 29.  
On moist clay banks. On the south bank of the railway between Broad Green and Roby.—*W. H.* On the left-hand side of the Upton road, about 150 yards past the stream. Fruiting in March and April.
4. B. WAHLENBERGII. Schwaegr. (Wahlenberg's T.) Wils. T. 47.  
In many places not uncommon. Near the railway bridge beyond Lower Bebington, plentiful.
5. B. MARRATII. Hook and Wils. (Marrat's T.) Wils. T. 32.  
On the shore at Southport, plentiful. Fruiting in September.
6. B. CALLOPHYLLUM. R. Br. (Broad-leaved T.) Wils. T. 33.  
Growing with the last. First found in Britain by F. P. Marrat. Very rare. Fruiting in September.
7. B. WARNEUM. Blandow. (Waren's T.) Wils. T. 12.  
Found with the two last species, plentiful. Fruiting in September.
8. B. PSEUDOTRIQUETRUM. Schwaegr. (Alpine bog T.) Wils. T. 30.  
In the same ditch as mentioned before on Bidston Moss. It is probable that Mr. Skellon meant this place when he said Bidston Marsh, in Dr. Dickinson's "Flora."
9. B. PALLENS. Swartz. (Pale-leaved T.) Wils. T. 29.  
By the sides of ditches and on heathy ground, not uncommon. In the deep drains on the sand hills, plentiful. Fruiting in August. Southport.
10. B. CERNUUM. Hed. (Drooping T.) Wils. T. 48.  
On the shore at Southport, very plentiful. Fruiting in June.
11. B. INCLINATUM. Br. and Sch. (Small-mouthed T.) Wils. T. 49.  
Among the sand hills from Crosby to Southport, abundant. Fruiting from May to August.
12. B. INTERMEDIUM. Brid. (Many-seasoned T.) Wils. T. 49.  
Old quarries, walls, &c., very common. Fruiting from July to January.

MUSCI OF LIVERPOOL.

13. *B. BIMUM*. Schreb. (Lowland bog T.) Wils. T. 49.  
In a swampy place by the side of the canal at Litherland.—*F. P. Marrat*. The railway cutting, Olive Mount.—*W. H.*
14. *B. CAPILLARE*. Hed. (Greater matted T.) Wils. T. 29.  
Old walls, hedge banks, &c., very common. Commencing to fruit in March.
15. *B. CÆSPITICIUM*. Linn. (Lesser matted T.) Wils. T. 29.  
Rocks and walls. Not so common as the preceding. Fruits later.
16. *B. ATROPURPUREUM*. Web. & Mohr. (Dark purple T.) Wils. T. 50.  
Wavertree stone quarry, on the Liverpool side of the mill. Fruiting in October.
- \* *B. FUNKII*. Schreb.  
On the shore at Southport.—*Wm. Wilson, Esq. and F. P. Marrat*.
17. *B. JULACEUM*. Smith. (Slender-branched T.) Wils. T. 28.  
Bidston Hill.—*W. S.* This requires confirmation.
18. *B. ARGENTEUM*. Linn. (Silvery T.)  
On old walls and waste lands, very abundant. Fruiting in winter.
19. *B. BRYUM TOZERI*. Grev. (Mr. Tozer's T.) Wils. T. 50.  
This rare small species grows in a shady lane near Wallasey Pool; a footpath leads from the second wooden bridge, crossing branches of the pool from Seacombe to Poolton, to the said lane. Not fruiting, June, 1864.—*F. P. Marrat*.
20. *B. COCHLEARIFOLIUM*. Wils. pro tem. (Boat-leaved T.)  
This new species was found in the quarry at Wavertree. It is growing under a glass shade, and as soon as it fruits I intend giving a proper description of it. A very singular plant.
21. *B. ROSEUM*. Schreb. (Rosaceous Thyme T.) Wils. T. 29.  
On the sand hills among the willows, not frequent. It has not been found fruiting here.

*Genus XXVIII.*—*MNIUM*. Bruch and Schimper. *Thyme Thread Moss*.

1. *M. AFFINE*. Blandow. (Many-fruited Thyme T.) Wils. T. 51.  
In damp grassy places, hedge banks, and by the sides of ponds, not uncommon.
2. *M. CUSPIDATUM*. Hed. (Pointed Thyme T.) Wils. T. 31.  
New Brighton, Formby, and Southport, plentiful, but local. Fruiting in May.
3. *M. ROSTRATUM*. Schwaegr. (Long-beaked Thyme T.) Wils. T. 30.  
Near Formby.—*W. H. Ainsdale.*—*F. P. Marrat*. Rare. Fruiting in March.
4. *M. SERRATUM*. Brid. (Serrated Thyme T.) Wils. T. 31.  
Between Birkdale and Ainsdale on a bank. Fruit not mature, April.
5. *M. HORNUM*. Linn. (Swan-necked Thyme T.) Wils. T. 31.  
Hedge banks, roots of trees, &c., very common. Commences to fruit in March.
6. *M. UNDULATUM*. Hed. (Long-leaved Thyme T.) Wils. T. 30.  
In woods, frequent. Fruiting in the old lane at Formby, and by the side of an old pit between Little Storeton and Prenton.

# MUSCI OF LIVERPOOL.

7. *M. STELLARE.* Hed. (Star-leaved Thyme T.) Wils. T. 51.  
In a swampy lane between Birkdale and Ainsdale. Very rare.
8. *M. PUNCTATUM.* Hed. (Dotted Thyme T.) Wils. T. 30.  
Fruiting in the old quarry at Fir Grove—*W. H.* Wet walls, and by the side of wells, common. Fruiting in April.

## SUB-ORDER XIV.—MEESIEÆ.

### *Genus* XXIX.—MEESIA. Hedwig.

1. *M. ULIGINOSA.* Hed. (Dwarf M.) Wils. T. 28.  
Sand hills at Southport. I first found this moss in this locality. Fruiting in June and July.—*F. P. Marrat.*

### *Genus* XXX.—AMBLYODON. Palisot de Beauvois. *Thread Moss.*

1. *A. DEALBATUS.* P. Beauv. (Lesser pale T.) Wils. T. 28.  
Plentiful on the sand hills from Crosby to Southport. Fruiting in June and July.

## SUB-ORDER XV.—FUNARIEÆ.

### *Genus* XXXI.—FUNARIA. Schreber. *Cord Moss.*

1. *F. HYGROMETRICA.* Hed. (Common C.) Wils. T. 20.  
Very common in wet places, quarries, &c. Fruiting nearly all the year.

### *Genus* XXXII.—PHYSCOMITRIUM. Bridel. *Bladder Moss.*

1. *P. ERICITORUM.* De Notoris. (Narrow-leaved B.) Wils. T. 7.  
Common on banks.—*W. H.* I have not found this species, although I have sought carefully for it, and most assuredly it is not common.
2. *P. PYRIFORME.* Br. and Sch. (Common B.)  
Moist banks, and by the sides of ditches, common. Literally covering a ditch side for about 100 yards, on the road between Wavertree and Broad Green.—*W. H.*

## SUB-ORDER XVI.—BARTRAMIEÆ.

### *Genus* XXXIII.—BARTRAMIA. Hedwig. *Apple Moss.*

1. *B. FONTANA.* Brid. (Fountain A.) Wils. T. 23.  
Plentiful in marshy places. Seldom fruiting in this neighbourhood.
2. *B. POMIFORMIS.* Hed. (Common A.) Wils. T. 23.  
Near Childwall church.—*W. H.* On the right-hand side of the lane leading from Smithdown-lane to Mr. William Rathbone's, by the ditch side. The species named *Ithyphylla* in Dr. Dickinson's "Flora," is only a variety of this moss fruiting in May and June.

SUB-ORDER XVII.—OREADEÆ.

*Genus XXXIV.—CATOSCOPIUM.* Bridel. *Apple Moss.*

C. NIGRITUM. Brid. (Lurid. A.) Wils. T. 14.

- On the flat sandy shore at Southport. Fruiting in July.—*Rev. H. H. Higgins.* Rare.

SUB-ORDER XVIII.—SPLACHNEÆ.

*Genus XXXV.—SPLACHNUM.* Bruch and Schimper. *Collar Moss.*

1. S. AMPULLACEUM. Linn. (Flagon-fruited C.) Wils. T. 9.

I am told that this species grows on Simmon's-wood and Rainford Mosses; observed there also by Mr. Shepherd, growing on dung.

*Genus XXXVI.—TETRAPLODON.* Bruch and Schimper.

1. T. MNOIDES. Br. and Sch. (Brown-tapering C.) Wils. T. 9.

On Rainford Moss. Rare.—*W. S. Windle Moss.*—*Rev. H. H. Higgins.* Fruiting in June.

SUB-ORDER XIX.—FISSIDENTEÆ.

*Genus XXXVII.—FISSIDENS.* Hedwig. *Flat Fork Moss.*

1. F. EXILIS. Hed. (Slender F.) Wils. T. 53.

On the right bank of Ditton brook, about 150 yards beyond the station. Fruiting in January.—*Rev. H. H. Higgins and F. P. Marrat.* Very rare. River bank beyond New Ferry. Fruiting in April, 1855.—*F. P. Marrat.*

2. F. VIRIDULUS. Linn. (Green F.) Wils. T. 53a.

On moist hedge banks, &c., common.

VAR. INCURVUS.

Growing with *exilis* in fruit.—*F. P. Marrat.* About Gillbrook.—*W. S.* I think this must be the species marked *tamarindifolium* in Dr. Dickinson's "Flora".

VAR. PUSILLUS.

In a stream that runs through Bromboro' wood. Fruiting in August.

3. F. BRYOIDES. Hed. (Common F.) Wils. T. 16.

About Gillbrook. Bidston hill, fine. Fruiting in December. Not so common in similar situations as the preceding.

4. F. OSMUNDOIDES. Hed. (Alpine F.) Wils. T. 16.

In Dr. Dickinson's "Flora", locality not stated. Requires confirmation.

5. F. ADIANTOIDES. Hed. (Marsh F.) Wils. T. 16.

Occasionally among the sand hills. Fruit rare. Fruiting in the old lane at Formby, very fine.

6. F. TAXIFOLIUM. Hed. (Yew-leaved F.) Wils. T. 16.

Moist shady places, not uncommon. Fruiting in February.

SECTION II.—PLEUROCARPI.

SUB-ORDER XX.—ISOTHECIEÆ.

*Genus XXXVIII.—ISOTHECIUM. Bridel. Frond Moss.*

1. I. MYURUM. Dill. (Blunt-leaved F.) Wils. T. 25.  
At the roots of trees in the private road from Rock Ferry to Storeton. Fruiting in November.
2. I. MYOSUROIDES. Dill. (Acute-leaved F.) Wils. T. 25.  
Trees about Bebington—W.S. The little wood, Croxteth.—W. H.
- I. ALOPECURUM. Dill. (Foxtail T.) Wils. T. 25.  
On the sides of Patrick Well, Patrick Wood.

*Genus XXXIX.—CLIMACIUM. Weber and Mohr.*

- C. DENDROIDES. Web. and Mohr. (Marsh-tree Moss.) Wils. T. 25.  
Fruiting in October in an old lane running parallel with the railway from Formby to Hightown, the first lane on the left-hand side going from Formby to the old burying ground. This is the lane so often spoken of.

*Genus XL.—LESKEA. Hedwig.*

1. L. POLYCARPA. Ehrh. (Many-fruited L.)  
At the roots of damp trees in Hooton Park. Fruiting late in June.
2. L. SERICEA. Dill. (Silky L.)  
On walls about Aintree. Fruiting in July and August.—W. H. and F. P. Marrat.

SUB-ORDER XXI.—HYPNEÆ.

*Genus XLI.—HYPNUM. Dillenius. Feather Moss.*

SECT. I.—Leaves more or less spreading every way.

A. Stem creeping, irregularly branched; or occasionally arched and pinnate.

\* Leaves acute; nerved half way or more.

+ Leaves plicate. Plumosa.

1. H. ALBICANS. Dill. (Whitish F.) Wils. T. 25.  
On the sand hills at Crosby.—H. F. Southport. Fruiting in both places.
2. H. SALEBROSUM. Hoff. (Smooth-stalked streaky F.) Wils. T. 55.  
A marsh variety of this rare moss grows with *Hypnum rutabulum* in the ditch near the first gate that crosses the large drain on Bidston Moss. Fruiting from November to January.
3. H. LUTESCENS. Dill. (Rough-stalked yellow F.) Wils. T. 25.  
This and *Tortula ruralis* clothe the sand hills on both sides of the Mersey.

# MUSCI OF LIVERPOOL.

++ Leaves substriated or smooth, mostly serrated.

A. Fruit-stalk, rough. Scabriseta.

Lid conical or rostellate.

§ 1. Velutina.

4. H. PLUMOSUM. Swartz. (Rusty F.) Wils. T. 25.

In damp situations, occasionally. Patrick Wood, by the stream.  
Fruiting in March.—*F. P. Marrat*.

5. H. POPULEUM. Swartz. (Matted F.) Wils. T. 24.

On walls and trees, not uncommon. Fruiting in February and March.

6. H. VELULINUM. Dill. (Velvet F.) Wils. T. 26.

On walls, and in damp hollows, &c., very common. Fruiting from December to May.

§ 2. Illicebra.

7. H. CÆSPITOSUM. (Green-patch F.) Wils. T. 55.

On a rocky bank by the side of the stream running through Poolton. Fruiting in October.

§ 3. Rutabula.

8. H. RUTABULUM. Dill. (Common rough-stalked F.) Wils. T. 26.

Rocks, trees, and damp places, very common.

9. H. RIVULARE. Bruch. (River rough-stalked F.)

By the sides of streams in Bebington Woods, in a barren state.  
Fruiting round the small pond in Patrick Wood in Spring.

‡‡ Lid rostrate. Prælonga.

10. H. PILIFERUM. Vaill. (Hair-pointed F.) Wils. T. 25.

Western Point.—*Rev. H. H. Higgins*. Garston. Both barren.

11. H. PRÆLONGUM. Dill. (Prolonged F.) Wils. T. 25.

Hedge banks, woods, &c., very common. Fruiting in December to May.

12. H. SWARTZII. Turn. (Swartz's F.) Wils. T. 55.

Not uncommon by the sides of ditches and ponds.—*F. P. Marrat*.

13. H. PUMILUM. Wils. (Dwarf F.) Wils. T. 55.

Bromboro' Woods. Fruiting in September.—*F. P. Marrat*.  
Knowsley Park.—*W. H.* Rare.

B. Fruitstalk smooth.

Lid rostrate.

§ Striata.

14. H. STRIATUM. Hed. (Common striated F.)

Hedge banks in Cheshire, frequent.—*F. P. Marrat*. Near Broad Green.—*W. H.* Fruiting in March.

§§ Conferta.

15. H. RUSCIFOLIUM. Dill. (Long-beaked water F.) Wils. T. 26.

On stones in streams. Plentiful in several places in Cheshire, Walton Mere.—*H. F.* Fruiting in December.



16. *H. CONFERTUM*. Dicks. (Clustered F.) Wils. T. 26.  
On stone walls and hedge banks, common. Fruiting from October to March.  
VAR. *MEGAPOLITANUM*.  
Crosby sand-hills.—*W. H. and W. Wilson, Esq.* A water variety is found in a pond between Little Storeton and Prenton.
17. *H. MURALE*. Dill. (Wall F.) Wils. T. 24.  
On the wall near the railway bridge, beyond Lower Bebington, in April, 1855, fruiting.—*F. P. Marrat*.
- + + Lid conical. *Serpentia*.
18. *H. ELODES*. Spruce. (Fine-leaved marsh F.) Wils. T. 56.  
I first pointed out this moss to Mr. Wilson as growing at Southport.
19. *H. RADICALE*. P. Beauv. (Rigid brook-side F.) Wils. T. 25.  
First found on the edge of Mr. Bewley's fish-pond, Poulton.—*F. P. Marrat*. In a pond at Huyton on decayed wood, with *H. riparium*.—*Rev. H. H. Higgins and F. P. Marrat*. Fruit decaying in June.
20. *H. SERPENS*. Dill. (Creeping F.) Wils. T. 24.  
In damp places, and among other mosses, common. Fruiting from April to July.
21. *H. RIPARIUM*. Dill. (Short-beaked water F.) Wils. T. 24.  
On stones and trees growing in water, not uncommon. In pits.  
VAR. 1.  
With serrated leaves, in the Ellesmere canal.  
VAR. 2.  
With long leaves, serrated at the tips, appearing intermediate between this and *fruitans*, in a pond, near the road in the wood, in the private road from Rock Ferry to Storeton.
- \*\* Leaves acute, mostly squarrose, shortly nerved or nerveless.  
§ *Stellata*.
22. *H. POLYGAMUM*. Bryol. Eur. (Cluster-flowered F.) Wils. T. 56.  
On the sand hills from Southport to Crosby, generally plentiful. First found by W. H., fruiting in June and July. Warbrick Moor.
23. *H. STELLATUM*. Dill. (Yellow-starry F.) Wils. T. 26.  
On the sand hills in damp places, and about Gillbrook, of a bright green colour. On walls near the railway at Rainhill.—*Rev. H. H. Higgins*. Fruiting in June.
- \*\*\* Leaves roundish, rather obtuse, entire, two-nerved or nerveless.  
§ *Straminea*.
24. *H. CORDIFOLIUM*. Swartz. (Heart-leaved F.) Wils. T. 56.  
In marshes and ditches, not uncommon. Bebington Heath, in ponds. Found fruiting in May in a pond at Rainhill, by *Rev. H. H. Higgins*.  
VAR.  
With fasciculated branches and very crowded leaves. Grows in a ditch in Birkdale Park, Southport. Has not been found in fruit.

# MUSCI OF LIVERPOOL.

- B. Stem pinnate, not villous, erect; fruit-stalk from the upper part of the stem; inflorescence dioicous.
- \* Leaves nerveless, or two-nerved at the base, entire.
25. *H. CUSPIDATUM*. Dill. (Pointed Bog F.) Wils. T. 26.  
In damp and wet places, very common. Fruiting in Spring.
26. *H. SCHREBERI*. Dill. (Schreber's F.) Wils. T. 24.  
In woods and among gorse bushes. Bidston-hill, plentiful. Not found in fruit.
- \*\* Leaves nerved half way, obtuse, entire.
27. *H. PURUM*. Dill. (Neat Meadow F.) Wils. T. 24.  
Hedge-banks, woods, &c., very common. Fruiting with the *Climacium dendroides* at Formby: the only time it has been found fruiting in this district.
- C. Stem pinnate or bipinnate erect; tomentous with branched fibres (villi), amongst the leaves; fructification from the upper part of the stem.
- § Stems doubly or triply pinnate. *Tamariscina*.
  - \* Leaves papillose, nerved almost to the apex.
28. *H. TAMARISCINUM*. Hed. (Tamarisk F.) Wils. T. 57.  
Shady places near woods, common. Has not been found fruiting.
- \*\* Leaves smooth, two-nerved at the base.
29. *H. SPLENDENS*. Dill. (Glittering F.) Wils. T. 25.  
Moist shady places, and on the sand-hills, Southport, common. Not yet found fruiting.
- D. Stems pinnate, destitute of villi, more or less erect, bearing fructification in the upper part; leaves more or less squarrose, serrulate, plicato-striate below, two-nerved at the base or nerveless; capsule mostly short or roundish; lid conical; inflorescence dioicous.
30. *H. TRIQUETRUM*. Dill. (Triangular-leaved F.) Wils. T. 26.  
In woods, and on the sand hills, &c. frequent. Does not fruit here.
31. *H. LOREUM*. Dill. (Rambling mountain F.) Wils. T. 26.  
In the lane by the finger-post leading from Wavertree church to Woolton.—*F. P. Marrat*. Walton Mere, and ditch sides of ditto, plentiful.—*H. F.*
32. *H. SQUARROSUM*. Dill. (Drooping-leaved F.) Wils. T. 26.  
Fruiting in the road from Eastham to Sutton, September, 1853. Again in November, 1854, in the road to the tile works, between Rock Ferry and Eastham.—*F. P. Marrat*. Fruit rare. Barren plants growing among grass, common.

## SECT. II.—Leaves secund.

- A. Stem pinnate, more or less erect, fructification near the middle; leaves falcato-sekund.
- \* Leaves nerved half way, or more, nearly entire. *Adunca*.
33. *H. FLUITANS*. Dill. (Floating F.) Wils. T. 58.  
In ponds and ditches, not uncommon. This and *H. Kneiffii* are about equally distributed; neither has been found in fruit.
34. *H. REVOLVENS*. Swartz. (Twirling F.) Wils. T. 58.  
In ponds, ditches, and marshy places, not uncommon. In damp places among the sand hills, frequent. Southport, abundant. Not found fruiting.

35. *H. ADUNCUM*. Dill. (Claw-leaved F.) Wils. T. 26.  
Clay fields by the side of the tram-road leading to Bidston Warbrick Moor.—*H. F.*
36. *H. KNEIFFII*. Sch. (Kneiff's F.) Wils. T. 58.  
In ponds abundant, about Southport. A small variety is found in the old quarry, at Fir Grove, West Derby.—*W. H.* A variety with very falcate leaves is found on the shore at Southport.
37. *H. LYCOPODIODES*. Neck. (Large claw-leaved F.) Wils. T. 58.  
Among the sand hills abundant, particularly about Southport.
- \*\* Leaves serrulate, nerved above half way.
38. *H. FILICINUM*. Dill. (Lesser golden Fern F.) Wils. T. 26.  
Damp places, not uncommon in a barren state.
39. *H. COMMUTATUM*. Dill. (Curled Fern F.) Wils. T. 27.  
On Bidston Moss.—*W. S.* Wet clay banks. Opposite the Black Bull Inn at Aintree. Fruiting in May.—*H. F.*
40. *H. UNCINATUM*. Hall. (Sickle-leaved F.) Wils. T. 26.  
On the left-hand side of the road leading from Cloughton Park to Bidston Hill, about 40 yards on this side of the stile that leads to the deep cutting. Fruiting plentifully in August.—*F. P. Marrat*. River Bank, beyond New Ferry.—*H. F.* Knowsley stone quarry. *W. H.*
- \*\*\* Leaves striated, nerveless, or two-nerved at the base, serrulate.
41. *H. MOLLUSCUM*. Dill. (Plumy-crested F.) Wils. T. 27.  
On the river banks near Egremont and beyond New Ferry. First found by *W. S.* In full fruit in August and September. Near Hightown.—*F. P. Marrat*.
- B. Stems procumbent, more or less pinnate; fructification near the base; leaves falcato-secund entire or serrulate, nerveless, or two-nerved at the base.  
\* Leaves acuminate. Cupressiformia.
42. *H. CUPRESSIFORME*. Dill. (Cypress-leaved F.) Wils. T. 27.  
On old walls, trunks of trees, and hedge banks, very common.  
VAR. COMPRESSUM.  
On bogs and heathy woods.  
VAR. NIGRO-VIRIDE.  
On the sand hills, frequent.
43. *H. RESUPINATUM*. Wils. (Upward-turned F.) Wils. T. 27.  
First found in Patrick Wood on trees, by *W. S.* Bromboro' and Eastham Woods, sparingly.
44. *H. PRATENSE*. Hoch. (Wet-meadow F.) Wils. T. 58.  
Found in the gutters about Gillbrook, in August last. Not uncommon among grass in damp places.—*F. P. Marrat*. Fields about Hale.—*W. H.*
- \*\* Leaves roundish, very concave, apiculate, entire. Scorpioidea.
45. *H. SCORPIOIDES*. Dill. (Scorpion F.) Wils. T. 27.  
Sparingly in a swamp near Southport.—*F. P. Marrat*.

MUSCI OF LIVERPOOL.

SECT. III.—Leaves complanate; stems procumbent.

A. Fructification radical from the base of the surculus.

• Leaves undulated.

46. H. UNDULATUM. Dill. (Waved F.) Wils. T. 24.

Abundant in moist woods. Eastham. Fruiting on Warbrick Moor in July.—*Rev. H. H. Higgins and F. P. Marrat.*

\*\* Leaves even, not undulated.

47. H. DENTICULATUM. Dill. (Sharp-leaved F.) Wils. T. 24.

Woods and hedge banks. Fruiting in June and July.—*F. P. Marrat.*

48. H. ELEGANS. Hooker. (Elegant F.) Wils. T. 59.

On heathy ground, common. Often growing with *denticulatum*.

SUB-ORDER XXII.—OMALIEÆ.

*Genus* XLII.—OMALIA. Bridel.

1. O. TRICHOMANOIDES. Dill. (Blunt Fern-like F.) Wils. T. 24.

On a hedge bank at Sutton, growing at the roots of trees. Fruiting in September.—*F. P. Marrat.*

*Genus* XLIII.—NECKERA. Hedwig.

1. N. COMPLANATA. Bryol. Eur. (Flat-leaved N.)

Near Storeton.—*W. S. Eastham Wood.—T. Sansom.* On the trunks of trees. Not frequent.—*F. P. Marrat.*

SUB-ORDER XXIII.—HOOKERIEÆ.

*Genus* XLIV.—HOOKERIA. Smith.

1. H. LUCENS. Dill. (Shining H.) Wils. T. 27.

Woods about Bebington.—*W. S. Patrick Wood.* In the private road from Rock Ferry to Higher Bebington, on the left-hand side near the top, sparingly.—*F. P. Marrat.* Fruiting in March.

SUB-ORDER XXIV.—FONTINALEÆ.

*Genus* XLV.—FONTINALIS. Dillenius. *Water Moss.*

1. F. ANTIPYRETICA. Linn. (Greater W.) Wils. T. 22.

In ponds, not uncommon. Two near localities are the canal at Bootle, and in the pond in the first wood on the left-hand side of the private road from Rock Ferry to Storeton. Fruiting in June and July.

## HEPATICÆ.

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THIS department has been so little studied that I have not been induced to give any particular arrangement. On some future occasion, when our list has reached something like what we may reasonably hope for, I will adopt some modern classification.

With the exception of a few plants that have been seen while looking for mosses, scarcely any of our local botanists have paid attention to this great family. Most of the species are of my own finding, and my observations have not extended over a period of more than six months.

### *Genus I.—RICCIA.*

1. *R. CHRYSSTALLINA*. Linn. (Chrystalline *R.*) Smith's E.B., T. 2546.  
Fields about Gill Moss; Botanic, and other gardens. About Fair-  
field generally plentiful.—*W. H.*
2. *R. FLUITANS*. Linn. (Floating *R.*) E. B. T. 252.  
In some pits, in an unpaved road, leading from Hale village to the  
railway station, Hale Wood.—*W. H.*

### *Genus II.—ANTHOCEROS.*

- A. *PUNCTATUS*. Linn. (Dotted *A.*) E. B., T. 1587.  
By the side of a long lane leading from Wallasey, in the direction  
of Leasowe.—*W. H.*

### *Genus III.—MARCHANTIA.*

1. *M. POLYMORPHA*. Linn. (Broad-leaved *M.*) E. B., T. 219.  
Wet places common. By the side of a pit near the tunnel at  
Walton, very luxuriant and fruiting.—*H. F.*
2. *M. CONICA*. Linn. (Conical *M.*) Lin. Spe. Plan. 1604.  
In situations similar to the last, common.
3. *M. HEMISPHERICA*. Linn. E. B., T. 503.  
Plentiful on the south side of the railway cutting, Olive Mount. A  
rocky lane near Lark Hill, West Derby.—*W. H.* In a quarry at  
Olive Mount.

Genus IV.—JUNGERMANNIA.

1. J. SETACEA. Web. (Bristle-like J.) Hook. T. 8.  
Rainford Moss, among *Sphagnum cymbifolium*, plentiful.—Rev. H. H. Higgins and F. P. Marrat.
2. J. ASPLENOIDES. Linn. (Asplenium-like J.) Hook. T. 18.  
Moist shady woods and hedge banks, particularly about Bebington. River bank beyond New Ferry. A very large and beautiful species.
3. J. SPHAGNI. Dicks. (Bog-moss J.) Hook. T. 38.  
Among *Sphagna*, not uncommon on the Mooses, such as Rainford, &c.
4. J. CRENULATA. Smith. (Crenulate J.) Hook. T. 37.  
In a quarry on the right-hand side of the road to Bidston, turning by the rails of Cloughton Park, near the Inn.  
VAR. GRACILLIMA.  
Bidston Hill.
5. J. COMPRESSA. Hook. (Compressed J.) Hook. T. 58.  
In a stream running through Bromboro' Wood, rare.—F.P. Marrat.
6. J. EMARGINATA. Ehrh. (Nicked J.) Hook. T. 27.  
Found with the last, not common.
7. J. INFLATA. Hud. (Inflated J.) Hook. T. 38.  
Heaths, quarries, and walls, in damp places, not uncommon.
8. J. VENTRICOSA. Dicks. (Bellied J.) Hook. T. 28.  
Among *Dicr. scoparium*, and *Leucob. glaucum*, in damp places. On Bidston Hill, on the left-hand side of the road leading to the deep cutting crossing the hill into the Upton-road.
9. J. BICUSPIDATA. Linn. (Two-pointed J.) Hook. T. 11.  
Damp walls and heathy places, abundant.
10. J. BYSSACEA. Rath. (Bissus J.) Hook. T. 12.  
Higher Bebington, at the top of the hill.
11. J. CONNIVENS. Dicks. (Connivent J.) Hook. T. 15.  
Bidston Moss. Not common, near the station for *Hypnum salebrosum*.
12. J. PUSILLA. Linn. (Tiny J.) Hook. T. 69.  
On wet clay by the side of a ditch in an old lane leading from Little Storeton to Prenton. Fruiting in October.
13. J. NEMOROSA. Linn. (Grove J.) Hook. T. 21.  
Knowsley Woods.—Rev. H. H. Higgins and F. P. Marrat.
14. J. UNDULATA. Linn. (Wavy J.) Hook. T. 22.  
In some damp heathy ground in the first lane past the quarry at Greenbank, at the corner of the lane leading to Wavertree church, plentiful.
15. J. ALBICANS. Linn. (Whitish J.) Hook. T. 25.  
On damp walls and hedge banks, very common.
16. J. COMPLANATA. Linn. (Flattened J.) Hook. T. 81.  
On the trunks of trees near the ground, not uncommon. In the old lane near the Bebington station, plentiful.

HEPATICÆ OF LIVERPOOL.

17. J. ANOMALA. Hook. (Anomalous J.) Hook. T. 34.  
Moss End Wood, Bold Moss, plentiful and fine.—*Rev. H. H. Higgins and F. P. Marrat.*
18. J. TAYLORI. Hook. (Taylor's J.) Hook. T. 57.  
By the side of a well at Bidston, from specimens given me labelled *J. hyalina*, and found by *W. Skellon*.
19. J. SCALARIS. Schrad. (Stair J.) Hook. T. 61.  
Moist banks and quarries, particularly on heathy ground, very abundant.
20. J. POLYANTHOS. Linn. (Many-flowered J.) Hook. T. 62.  
By the ditch side on Bidston Moss. Patrick Well, Patrick Wood, &c.
21. J. TRICHOMANIS. Dicks. (Trichomanes J.) Hook. T. 79.  
Hedge banks and rocky places, particularly near heaths, very common.
22. J. BIDENTATA. Linn. (Two-toothed J.) Hook. T. 30.  
Almost everywhere. The commonest of the genus.  
VAR. OBTUSATA.  
In the old lane near the railway station at Bebington, not common.
23. J. HETEROPHYLLA. Schrad. (Odd-leaved J.) Hook. T. 31.  
On the trunks of trees, particularly those in damp situations, near the ground, not uncommon.
24. J. REPTANS. Linn. (Creeping J.) Hook. T. 75.  
On the trunks of trees near the ground, and on the adjacent ground in a peaty soil. Knowsley and Bold Woods.—*Rev. H. H. Higgins and F. P. Marrat.* Eastham and Bebington Woods.—*H. F.*
25. J. CILLIARIS. Linn. (Fringed J.) Hook. T. 65.  
Bidston Hill, about 50 yards from the lighthouse, towards the village. First found by *W. Skellon*. With *J. ventricosa*.—*F. P. Marrat.*
26. J. MACKAILI. Hook. (Mackay's J.) Hook. T. 53.  
With *J. ciliaris* and *ventricosa*, sparingly.
27. J. DILATATA. Linn. (Dilated J.) Hook. T. 5.  
On trees in woods. Bromboro', Eastham, Speke, &c., not uncommon.
28. J. TAMARISCI. Linn. (Tamarisk J.) Hook. T. 6.  
On the left-hand side of the road to the deep cutting over Bidston Hill, near the station, for *Hypnum uncinatum*, plentiful.
29. J. SERPYLLIFOLIA. Dicks. (Thyme-leaved J.) Hook. T. 42.  
On trunks of trees, Bromboro' Woods.
30. J. PINGUIS. Linn. (Fat J.) Hook. T. 46.  
Clay banks beyond New Ferry.—*H. F.* Moist clay banks, common.
31. J. MULTIFIDA. Linn. (Many-cut J.) Hook. T. 45.  
Moist banks, common.  
VAR. SINUATA.  
In ditches, Bidston Moss, &c.
32. J. BLASIA. Hook. (Blasin J.) Hook. T. 82, 83, and 84.  
Among gorse bushes, Walton Mere.—*H. F.* Requires confirmation.

HEPATICE OF LIVERPOOL.

33. J. EPIPHYLLA. Linn. (Overleaf J.) Hook. T. 47.  
Wet rocks, and by the sides of ditches very common. Fruiting in April.
34. J. TURBINATA. Wils. E. B. sup. (Turbinate J.)  
River bank beyond New Ferry.—H. F. Near Bromboro' Pool.—  
*F. P. Marrat.*
35. J. WILSONIANA. Nees. (Wilson's J.)  
River bank beyond New Ferry.—*F. P. Marrat.* Rare.
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ADDENDUM, PAGE 7.

7. SPHAGNUM CONTORTUM.

Warbrick Moor.—*F. P. Marrat.*

The SPHAG. ACUTIFOLIUM, FIMBRIATUM, CUSPIDATUM, and SQUARROSUM, were found fruiting on Rainford Moss, in July, 1855, after these sheets had gone to press.—  
*Rev. H. H. Higgins.*

THE Rev. Mr. Higgins's name has been omitted in the prefatory note that I might here, whilst acknowledging his aid, give a brief account of his Bryarium,—which is a Ward's case, kept in the reverend gentleman's garden at Rainhill.

About 100 species of Musci, most of which have been collected in this neighbourhood, are grown in it, and are flourishing beautifully. The case contains several rarities, some of which would have been lost to our Flora, but for the better development which has attended their careful growth, and enabled the botanist to recognise their specific characters. One of the principal advantages resulting from this mode of treatment is the facility presented of examining the inflorescence in its several stages. From another point of view the Bryarium is highly interesting, for so curious are the forms and so varied the shades of colour of these minute plants, that the cultivator is rewarded in studying these peculiarities, common in fact to the entire vegetable kingdom, but apt to be overlooked in objects so small.



# ALPHABETICAL INDEX

## TO THE

### ORDERS, SUB-ORDERS, AND GENERA:

#### MUSCI AND HEPATICÆ.

	PAGE.		PAGE.
<i>Acrocarpi</i> .....	7	<i>Leskea</i> .....	14
<i>Amblyodon</i> .....	16	<i>Leucobryum</i> .....	7
<i>Anthoceros</i> ..... (Hepat.)..	24	<i>Marchantia</i> ..... (Hepat.)..	24
<i>Archidium</i> .....	7	<i>Meesia</i> .....	16
<i>Atrichum</i> .....	13	<i>Mnium</i> .....	15
<i>Aulacomnion</i> .....	13	<b>MUSCI</b> .....	7
<i>Bartramia</i> .....	16	<i>Neckera</i> .....	23
<i>Bartramia</i> .....	16	<b>OMALIÆ</b> .....	23
<b>BRYACEÆ</b> .....	7	<i>Omalia</i> .....	23
<b>BRYÆ</b> .....	13	<b>ORRADEÆ</b> .....	17
<i>Bryum</i> .....	14	<b>ORTHOTRICHÆ</b> .....	12
<b>CAMPYLOPODEÆ</b> .....	9	<i>Orthotrichum</i> .....	12
<i>Campylopus</i> .....	9	<b>PHASCEÆ</b> .....	7
<i>Catoscopium</i> .....	17	<i>Phascum</i> .....	7
<i>Ceratodon</i> .....	9	<i>Physcomitrium</i> .....	16
<i>Chimacium</i> .....	18	<i>Pleurocarpi</i> .....	18
<b>DICRANÆ</b> .....	8	<i>Pogonatum</i> .....	13
<i>Dicranum</i> .....	8	<b>POLYTRICHÆ</b> .....	13
<i>Didymodon</i> .....	10	<i>Polytrichum</i> .....	13
<i>Distichium</i> .....	10	<b>POTTIÆ</b> .....	9
<b>ENCALYPTEÆ</b> .....	11	<i>Pottia</i> .....	9
<i>Encalypta</i> .....	11	<b>PYCHOMITRIÆ</b> .....	12
<b>FISSIDENTÆ</b> .....	17	<i>Ptychomitrium</i> .....	12
<i>Fissidens</i> .....	17	<i>Racomitrium</i> .....	11
<b>FONTINALÆ</b> .....	23	<i>Riccia</i> ..... (Hepat.)..	24
<i>Fontinalis</i> .....	23	<i>Schistidium</i> .....	11
<b>FUNARIÆ</b> .....	16	<b>SPHAGNACÆ</b> .....	7
<i>Funaria</i> .....	16	<i>Sphagnum</i> .....	7
<b>GRIMMIÆ</b> .....	11	<b>SPLACHNÆ</b> .....	17
<i>Grimmia</i> .....	11	<i>Splachnum</i> .....	17
<i>Gymnostomum</i> .....	8	<b>TETRAPHIDÆ</b> .....	13
<b>HOOKERIÆ</b> .....	23	<i>Tetraphis</i> .....	13
<i>Hookeria</i> .....	23	<i>Tetraplodon</i> .....	17
<b>HEPATICÆ</b> .....	24	<i>Tortula</i> .....	10
<b>HYPNÆ</b> .....	18	<b>TRICHOSTOMEÆ</b> .....	10
<i>Hypnum</i> .....	18	<i>Trichostomum</i> .....	10
<b>ISOETECIÆ</b> .....	18	<b>WEISSIÆ</b> .....	8
<i>Isoetecium</i> .....	18	<i>Weissia</i> .....	8
<i>Jungermannia</i> ..... (Hepat.)..	25		
<i>Leptobryum</i> .....	14		

# APPENDIX II.

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## SUPPLEMENT

TO THE

# FLORA OF LIVERPOOL.

BY

JOSEPH DICKINSON, M.A., M.D., F.R.S.

M.R.I.A., F.L.S., &c. &c. &c.

PRESIDENT OF THE SOCIETY.

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[READ BEFORE THE SOCIETY ON THE 14TH OF MAY, 1855.]

#### NOTE.

The "Flora of Liverpool" was published in 1851. Since that time many ardent lovers of Botany have carefully re-investigated the ground, and consequently some most interesting discoveries and additions have been made. These are now embodied in the following Supplement. Amongst those who by their contributions have aided me in rendering the "Flora" more complete, I have much pleasure in enumerating the names of Messrs. J. Price, F. P. Marrat, H. C. Fisher, T. Williams, J. Shillitoe, and Dr. J. B. Wood, in addition to those given in the "Flora" and in the Supplement itself. To Dr. D. P. Thomson, the able Secretary of the Liverpool Literary and Philosophical Society, I am especially indebted for much valuable advice and assistance. Most of the habitats named have been confirmed by a personal examination, and where this has not been practicable, I have in almost every case examined the plant itself. The arrangement and abbreviations are the same as were adopted in the "Flora."

## CLASS I.

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### DICOTYLEDONOUS, OR EXOGENOUS PLANTS.

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#### SUB-CLASS I. THALAMIFLORÆ. (Ord. i.—xi.)

##### ORD. 1. RANUNCULACEÆ. Juss. *The Crowfoot Family.*

###### 1. CLEMATIS. Linn. *Traveller's Joy.*

*Polyandria Polygynia.* L.

###### 1. C. VITALBA. L. (Common T.) June—August. ½

This plant is found climbing amongst the bushes and trees in many places between the Decoy and Ditton Marsh, but as some *Lauristinas* are found in the same situation, we may infer that both have been introduced.

###### 2. RANUNCULUS. Linn. *Crowfoot, Spearwort.*

*Polyand. Polygyn.* L.

###### 1. R. CÆNOSUS. Guss. (*R. Lenormandi*, Schultz.) June, July. ¼

Pits, clayfields, Kirkdale.—*H. Fisher.* It does not seem to be very rare in the neighbourhood of Liverpool.

###### 3. AQUILEGIA. Linn. *Columbine.*

*Polyand. Polygyn.* L.

###### 1. A. VULGARIS. L. (Common C.) May, June. ¼

"Apparently truly wild by the brookside in Lathom New Park."—*J. Williams.* But in all such cases I believe it to be an outcast from gardens.—*J. D.*

ORD. II. BERBERIDACEÆ. Vent. *The Barberry Family.*

1. BERBERIS. Linn. *Barberry. Hexand. Monogyn. L.*

1. B. VULGARIS. L. (Common B.) May, June. ♀

Simmon's-wood Moss, very stunted, and "truly indigenous."—*T. Williams*. I cannot but express my doubts of its being so.—*J. D.*

ORD. III. PAPAVERACEÆ. Juss. *The Poppy Tribe.*

1. MECONOPSIS. Vig. *Welsh Poppy. Polyan. Polygyn. L.*

1. M. CAMBRICA. Vig. (Common W.) June. ♀

A specimen was brought to me in July, 1854, said to be gathered at Grange, on the banks of the Dee, but this requires confirmation. It does however grow (not very rarely) further north, in Westmoreland and Cumberland.

ORD. IV. CRUCIFERÆ. Juss. *The Cruciferous Family.*

SUB-ORD. L. PLEURORHIZÆ.

1. CHEIRANTHUS. Linn. *Wall Flower. Tetradyn. Siliq. L.*

1. C. CHEIRI. L. (Common W.) May, June. ♀

On old walls near Gayton, where it appears to have grown for many generations.—*J. Shillitoe*.

2. TURRITIS. Linn. *Tower Mustard. Tetradyn. Siliq. L.*

1. T. GLABRA. (Long-podded T.) May—July. ☉

"This plant is certainly not found at Southport"—*J. B. W., J. D.*

3. THLASPI. Linn. *Penny Cress.*

*Tetradyn. Siliculosa. L.*

1. T. ARVENSE. L. (Field P.) June, July. ☉

Hale bank, near the road side, by the Mersey. Potatoe field near Greenbank.—*W. H. Allerton*.—*J. Shillitoe*.

4. CAMELINA. Crantz. *Gold of Pleasure.*

*Tetradyn. Siliculosa. L.*

1. C. SATIVA. Crantz. (Common G.) June and July. ☉

I have seen a specimen said to be gathered on the Bath Farm, Ormskirk, by *T. Williams*. It has not been found elsewhere in this locality.

SUB-ORD. II. NOTORHIZEÆ.

5. ERYSIMUM. Linn. *Treacle Mustard*.

*Tetradyn. Siliquosa*. L.

1. E. CHEIRANTHOIDES. L. (Worm-seed T.) June—August. ☉

In a field near Sutton Moss.—*J. Harrison*. Southport.—*J. B. W.* Halewood, and Birkdale.—*F. P. M.* Roadsides between Heswall and Storeton.—*J. Skillitoe*. Between Skelmersdale and Upholland, abundant. Railway banks near Martin Mere, Ormskirk.—*T. Williams*.

SUB-ORD. III. ORTHOPLOCEÆ.

6. LEPIDIUM. Linn. *Pepper Wort*.

*Tetradyn. Siliculosa*. L.

1. L. SMITHII. Hook. (Smooth Field P.) April—Sept. 24

Southport.—*J. B. W.*

7. DILOTAXIS. De Cand. *Rocket*.

*Tetradyn Siliquosa*. L.

1. D. TENUIFOLIA. Br. (Wall Rocket.) June—Sept. 24

On old walls about Chester, plentifully.—*J. B. W.*

ORD. V. RESEDACEÆ. De Cand. *The Mignonette Family*.

1. RESEDA. Linn. *Dyer's Rocket, Mignonette*.

*Dodecand. Trigyn*.

1. R. FRUTICULOSA. L. (Shrubby-base D.) June. ♂ or 24

"Not found at Southport, I believe, having sought for it diligently." *J. B. W.* This is correct, yet it is abundant on Crosby sand hills, near the railway.

ORD. VI. VIOLACEÆ. De Cand. *The Violet Family*.

1. VIOLA. Linn. *Violet. Pentand. Monogyn*. L.

1. V. HIRTA. L. (Hairy V.) April, May. 24

I have never been able to find this plant in this neighbourhood, nor does it, I believe, now grow here, if ever it did.—*J. D.*

2. V. ODORATA. L. (Sweet V.) March, April. 24

Walton road side, near the railway bridge, most likely an outcast.—*H. Fisher*. A white variety is plentiful near the moat, in the New Park, on the Skelmersdale railway.—*J. Williams*.

3. V. PALUSTRIS. L. (Marsh V.) May—July. 4

"In an obsolete pit at Flaybrick; pass the quarries close to their south border, go on down a short lane, close to one of the large houses, into the main road running N. and S. It is in a little swamp over the west hedge."—*J. Price*. On Martin Mere, near Ormakirk.—*T. Williams*. Abundant on Warbrick Moor.—*H. Fisher*.

4. V. LUTEA. Huds. (Yellow Mountain V. or Yellow Pansy.)  
May—Sept. 4

Dr. J. B. Wood correctly remarks, "The Southport station is certainly incorrect," as, I believe, is that of "Netherton Moss," given by Mr. H. Fisher. Most probably in both cases *V. Curtisii* Forst. has been confounded with it.

8. V. LACTEA. Sm. (Cream Coloured or Haller's V.) May. 4  
Crosby sand hills. See Watson's *Cybele*, vol. i., p. 177, and vol. iii., p. 322.

ORD. VII. POLYGALACEÆ. Juss. *The Milkwort Family.*

1. POLYGALA. Linn. *Milkwort. Diadelph. Octand. L.*

Both varieties (*P. oxyptera* Reich. and *P. depressa* Wend.) are occasionally found on the sand hills at Crosby, &c.—*H. Fisher*, *J. Shillitoe*, &c. *J. D.*

ORD. VIII. CARYOPHYLLACEÆ. Juss.

*The Chickweed Family.*

SUR-ORD. I. SILENEÆ.

1. SILENE. Linn. *Catchfly. Decand. Trigyn. L.*

1. S. INFLATA. Sm. (Bladder Campion.) June—August. 4

Var. B. Br. Fl. Mr. James Shillitoe has given me specimens gathered by him amongst furze near Clatter Bridge toll-bar, Cheshire.

2. S. ANGLICA. L. (English C.) June—November. ☉

Southport, abundant.—*J. B. W.*

SUB-ORD. II. ALSINEÆ.

2. SAGINA. Linn. *Pearlwort. Tetrand. Tetragyn. L.*

1. S. MARITIMA. Don. (Sea P.) May—September. ☉

Southport, plentiful.—*J. B. W.*

2. S. SUBULATA. Wimm. (Awl-shaped P.) June—Aug. 4

Bebington.—*J. Shillitoe*.

3. ARENARIA. Linn. *Sandwort*. *Decand. Trigyn.* L.

1. A. TENUIFOLIA. L. (Five-leaved S.) May, June. ☉

Dr. J. B. Wood confirms the opinion expressed in the *Flora*, that the Southport habitat, as given by Mr. Aughton, is "incorrect."

4. STELLARIA. Linn. *Stitchwort*. *Decand. Trigyn.* L.

1. S. GLAUCA. With. (Glaucous Marsh S.) May—July. 24

Since the publication of the "*Flora*," I have received abundant confirmation of this plant being found plentifully in this neighbourhood. Dr. Wood says, "It is abundant in a peat-moss about a mile and a half from Southport, where it was first found by me in 1841, and shown to H. Aughton." Mr. J. Horsfield states, "I gathered the plant myself near Scarisbrick in 1831, August 30, together with *Cerastium aquaticum*." And I have had specimens sent to me, gathered by Mr. T. Williams, in ditches at the east end of Martin Mere, where it grows plentifully.—J. D.

5. MALACHIUM. Fries. *Mouse-ear Chickweed*.

*Decand. Pentagyn.* L.

1. M. AQUATICUM. Fr. (Water M.) July, August. 24

Ditches near Scarisbrick.—J. Horsfield.

ORD. IX.—HYPERICACEÆ. *The Tutsan Family.*

1. HYPERICUM. Linn. *St. John's Wort*.

*Polyadelph. Polyand.* L.

1. H. DUBIUM. Leers. (Imperforate St. J.) July, August. 24

Near High Tranmere.—F. P. Marrat.

2. H. CALYGINUM. L. (Large-flowered S. J.) July—Sept. 24

This plant, which formerly was naturalized in Hale Woods, has now become extinct.

3. H. HIRSUTUM. L. (Hairy S. J.) July, August. 24

In a thicket at Aston.—J. Harrison.

ORD. X. ACERACEÆ. JUSS. *The Maple Family.*

1. ACER. Linn. *Maple*. *Octand. Monogyn.* L.

1. A. CAMPESTRE. L. (Common M.) May, June. 2

"Truly wild in Green-lane, near the Flax Mills, Burscough."—T. Williams.



ORD. XI. GERANIACEÆ. Juss. *The Geranium Family.*

1. GERANIUM. Linn. *Crane's-bill.*

*Monadelph. Decand. L.*

1. G. SANGUINEUM. L. (Bloody C.) July. 24

The plant near New Brighton and the "Half-way House," has been eradicated, and is also rapidly becoming so near the Hotel, Egremont. It is still abundant on the Dee shore.

2. G. COLUMBINUM. L. (Long-stalked C.) June, July. ☉

Southport and near Runcorn.—*J.B.W.* In a lane near Simmon's Wood Moss.—*T. Williams.*

2. ERODIUM. L'Herit. *Stork's-bill.*

*Monadelph. Pentand.*

1. E. MOSCHATUM. Sm. (Musky S.) June, July. ☉

Grange Hill.—*J. Shillitoe.* Near Chester.—*J.B.W.* Road side, Aughton Brow, near Ormskirk. Field on Mr. Waring's estate, Lathom.—*T. Williams.*

2. E. MARITIMUM. Sm. (Sea S.) May—Sept. 24

Mr. F. P. Marrat has found this plant growing both at Parkgate and Neston, thus confirming Turner and Dillwyn's (*Bot. Guide*) statement. Dr. Wood finds it growing plentifully on the opposite side of the Dee, at Flint and Rhyl.

SUB-CLASS II. CALYCIFLORÆ. (*Ord. xii.—xxii.*)

A. *Corolla Polypetalous.* (*Ord. xii.—xix.*)

ORD. XII. RHAMNACEÆ. Juss.

*The Buckthorn Family.*

1. RHAMNUS. Linn. *Buckthorn. Pentand. Monogyn. L.*

1. R. FRANGULA. L. (Alder B.) May, June. 24

Bath-wood, near Ormskirk. Blague Moss, Lathom.—*T. Williams.*

ORD. XIII.—LEGUMINOSÆ. JUSS.

*The Bean and Pea Family.*

1. ULEX. Linn. *Furze. Monodelph. Decand. L.*

1. U. GALLII. Planch. Spring and Autumn. 4

This plant is not rare about Bidston, New Brighton, Heswall, &c.; but, from finding many intermediate states between *U. gallii* and *U. nanus*, I am induced to regard it merely as a variety of the latter.

2. MEDICAGO. Linn. *Medick. Diadelph. Decand. L.*

1. M. DENTICULATA. Willd. (Reticulated M.) May—Aug. ☉

In the autumn of 1853, specimens of this plant were brought to Mr. W. Harrison, said to be gathered at Hale; but the plant has never been found in this neighbourhood since.

2. M. MACULATA. Sibth. (Spotted M.) May—Aug. ☉

Plentiful near Parkgate (July, 1851).—*J. Shillitoe.*

3. MELILOTUS. Tourn. *Melilot. Diadelph. Decand. L.*

1. M. OFFICINALIS. L. (Common Yellow M.) June—Aug. 4

Southport and near Runcorn.—*J. B. W. Dean Farm, Latham.—T. Williams.*

4. TRIGONELLA. Linn. *Fenugrek. Diadelph. Decand. L.*

1. T. ORNITHOPODIOIDES. D. C. (Bird's-foot F.) June, July. ☉

I have numerous fine specimens, gathered in August, 1854, by Mr. James Shillitoe, near Grange Landmark, Cheshire; and Dr. J. B. Wood finds it not sparingly on the opposite side of the Dee, and at Rydland Castle.

5. TRIFOLIUM. Linn. *Trefoil, Clover.*

*Diadelph. Decand.*

1. T. OCHROLEUCUM. L. (Sulphur-coloured T.) June—Aug. 4

I have specimens gathered on the banks of the East Lancashire Railway, near Ormakirk; and Mr. T. Williams informs me that he also has some, collected by him from the same banks. I believe that it has been introduced into this locality by some agency connected with the railway; and the same remark will apply to Mr. Sansom's habitat.

2. T. RESUPINATUM. Linn. (Reversed T.) August. ☉

This interesting plant has been found in two localities in this neighbourhood, viz. at Fairfield, abundantly, by Mr. Jas. Shillitoe and Mr. H. Shepherd, the able curator of the Liverpool Bot. Gard. and at St. Ann's Hill, Everton, by Mr. H. Fisher. "Cheshire, near New Brighton," is also mentioned as a habitat in the last (seventh) edition of the British Flora, on what authority I know not. It is not now, however, to be found in any of these situations. I have numerous good specimens from the first-named place.

ORD. XIV. ROSACEÆ. Juss.

*The Rose Family.*

1. GEUM. Linn. *Avens. Icosand. Polygyn.* L.
1. G. RIVALE. L. (Water A.) May—July. 4  
Plentiful in Bath Woods.—*T. Williams.*
2. RUBUS. Linn. *Bramble, Raspberry. Icosand. Polygyn.* L.
1. R. IDÆUS. L. (Common R.) May, June. 4  
Bath Woods, Ormskirk.—*T. Williams.*
2. R. SUBERECTUS. L. (Common B.) July, August. ½  
There is no doubt whatever of this species being found not sparingly in this neighbourhood. Specimens were sent to Dr. Lindley by Mr. T. Williams, and also to other competent authorities, in order that there might be no mistake, as the Mersey district is omitted in Babington's list given in Watson's valuable "*Cybele Britannica*." It is plentiful at Bath-wood; also at Crosby. Mr. James Shillitoe, who has given me good specimens, says, "This must be very common indeed, for in my rambles I had collected scores of specimens of it."—*J. D.*
3. R. CARPINIFOLIUS. W. & N. (Hornbeam-leaved B.) July, August. ½  
Hedges, Walton.—*H. Fisher.*
4. R. PLICATUS. W. & N. (Upright Bl.) June and July. ½  
Banks, Seven-pits, Aintree road.—*H. Fisher.*
5. R. AFFINIS. W. & N. June and July. ½  
Priory Lane, Walton.—*H. Fisher.*
6. R. LEUCOSTACHYS. Sm. (Downy-spiked B.) July & Aug. ½  
Common in hedges near Walton.—*H. Fisher.* Not uncommon in hedges in Lancashire and Cheshire.—*J. Shillitoe.*
7. R. RUDIS. W. (Rough B.) June and July. ½  
Hedge banks near Walton, with many varieties.—*H. Fisher.*
8. R. CORDIFOLIUS. W. & N. May and June. ½  
Hedges near Walton, frequent.—*H. Fisher.*
9. R. NEMOROSUS. Hayne. (Larger Dewberry.) June and July. ½  
Hedges, Walton.—*H. Fisher.*
10. R. SPRENGELII. W. (Sprengel's B.) June—Sept. ½  
Hedges near Everton.—*H. Fisher.*

SUPPLEMENT TO THE FLORA OF LIVERPOOL.

11. R. KOEHLERI. W. (Koehler's B.) July and Aug. ½  
Hedges, Eastham.—*H. Fisher*. Hedges, Claughton.—*J. Shillitoe*.  
Hedges and roadsides, Ince, Cheshire.—*F. P. Marrat*.
12. R. RHAMNIFOLIUS. W. & N. (Buckthorn-leaved B.) July  
and Aug. ½  
Hedges near Eastham.
3. FRAGARIA. Linn. *Strawberry*. *Icosand. Polygyn.* L.
1. F. ELATIOR. Ehrh. (Hautboy S.) June—October. ¼  
Dr. J. B. Wood says "I do not hesitate for a moment to say that it  
is wild on the banks of the Mersey, between the Decoy and Ditton  
Marsh," and Mr. F. P. Marrat adds, "It is seemingly indigenous  
near Roby, by a ditch side."
4. SANGUISORBA. Linn. *Burnet*. *Tetrand. Monogyn.* L.
1. S. OFFICINALIS. L. (Great B.) June—Aug. ¼  
In a field between Weston canal and Aston Hall, July, 1851.—  
*J. Harrison*. Sparingly at Parkgate Farm, Lathom.—*T. Williams*.
5. POTERIUM. Linn. *Salad-Burnet*. *Monœcia. Polyand.* L.
1. P. SANGUISORBA. L. (Common S.) June—Aug. ¼  
Below Halsall, rare.—*T. Williams*.
6. ROSA. Linn. *Rose*. *Dog Rose*. *Sweet Briar*.  
*Icosand. Polygyn.* L.
1. R. VILLOSA. L. (Villous R.) June and July. ½  
In a hedge leading from Lathom to Newborough Church, by the side  
of a footpath.—*T. Williams*. Frequent in hedges at Walton.—  
*H. Fisher*. At Bootle, West Kirby, Bebington, &c.
2. R. RUBIGINOSA. L. (True S.) June and July. ½  
Hedges near the village of Lower Bebington.—*H. Fisher*. An  
outcast.

ORD. XV. ONAGRACEÆ. JUSS.

*The Willow Herb Family.*

1. EPILOBIUM. Linn. *Willow Herb*. *Octand. Monogyn.* L.
1. E. ANGUSTIFOLIUM. L. (Rose-bright.) July. ¼  
Kirby Moss.—*J. Harrison*. Chat Moss.—*J. B. W.*

2. CIRCÆA. Linn. *Enchanter's Nightshade.*

1. C. LUTETIANA. L. (Common E.) June—Aug. 24

Bath Wood and Sayer's Wood, near Ormskirk.—*T. Williams.*

2. C. ALPINA. L. (Alpine E.) June—Aug. 24

I now suspect that the plants mentioned (in the Flora) were only states of the *C. Lutetiana* (*C. intermedia*, *D.C.*) At any rate the habitats there given require confirmation.

ORD. XVI. HALORAGACEÆ. R. Brown.

*The Water-Milfoil Family.*

1. MYRIOPHYLLUM. Linn. *Water-Milfoil.*

*Monœcia. Polyand. L.*

1. M. VERTICILLATUM. L. (Spiked W.) June, July. 24

Near the canal below Welsh Hall, Aughton. Martin Mere, near Ormskirk.—*T. Williams.*

2. M. ALTERNIFOLIUM. D.C. (Alternate-flowered W.) May—September. 24

Plentiful in ditches and ponds at Southport, and between Runcorn and Warrington.—*J. B. W.*

ORD. XVII. CUCURBITACEÆ. Juss.

*The Cucumber Family.*

1. BRYONIA. Linn. *Bryony. Dioecia Tri-pentand. L.*

1. B. DIOICA. Jacq. (Red-berried B.) May—Sept. 12

Near Ince, Cheshire, July, 1852.—*F. P. Marret. J. D.*

ORD. XVIII. GROSSULARIACEÆ. De Cand.

*The Gooseberry Family.*

1. RIBES. Linn. *Currant and Gooseberry. Pentand. Monogyn. L.*

1. R. GROSSULARIA. L. and R. NIGRUM. L.

Are not rare in Lathom Woods, and are considered by Mr. T. Williams as "truly indigenous." With this inference I cannot agree. *J. D.*

2. R. ALPINUM. L. (Tasteless Mountain C.) April and May. 12

In waste places near Burscough Abbey. "In the above place it is truly indigenous," according to Mr. T. Williams, with which conclusion I by no means agree.—*J. D.*

ORD. XIX. UMBELLIFERÆ. Juss.

*The Umbelliferous Family.*

*Pentand. Digyn. L.*

1. CICUTA. Linn. *Water Hemlock.*

1. C. VIROSA. L. (Cowbane or W.) June—Sept. 4

Ditch near Aintree Race Course.—*H. Fisher.* This requires confirmation.

2. CONIUM. Linn. *Hemlock.*

1. C. MACULATUM. L. (Common H.) June, July. ♂

This plant will soon be eradicated from this neighbourhood by the "herb gatherers." It has already disappeared from the neighbourhood of Birkenhead, where it was plentiful.

3. MYRRHIS. Tourn. *Cicely.*

1. M. ODORATA. Scop. (Sweet C.) May—July. 4

Not rare near old farm houses. Lathom, Bickerstaffe, Simmon's Wood, &c. Abundant near Maghull church yard.

ORD. XX. DIPSACÆ. Juss.

*The Teasel Family.*

1. DIPSACUS. Linn. *Teasel. Tetrand. Monogyn. L.*

1. D. PILOSUS. L. (Small T.) August, Sept. ♂

Aston Wood, Aston, July, 1851.—*J. Harrison.* Above the dungeon at Hale.—*W. H.*

ORD. XXI. COMPOSITÆ. Juss.

*The Composite Family.*

TRIBE 1. CICHORACEÆ. Juss. *Syngenesia Æqualis. L.*

1. LACTUCA. Linn. *Lettuce.*

1. L. MURALIS. Less. (Ivy-leaved L.) June—Aug. 4 or ♂

Field next to Hooton Station, left of Railway.—*F. P. Marrat.* Lathom Hall delph, and parapets of the bridge near the delph.—*T. Williams.*

2. CREPIS. Linn. *Hawk's-beard.*

1. C. PALUDOSA. Mœnch. (Marsh H.) July—Sept. 4

Sparingly in a ditch a mile east of Parkgate, Sept. 1853.—*J. Shillitoe.*

TRIBE 2. CYNAROCEPHALÆ. Juss. *Syngenes. Æqualis*. L.

1. CENTAUREA. Linn. *Knapweed, Blue-bottle, and Star-thistle*.

1. C. SOLSTITIALIS. L. (Yellow S.) July. ☉

It has been found on newly turned-up ground once at Bootle, and again at Seaforth. In both cases introduced doubtless with seed.

TRIBE 3. CORYMBIFERÆ. Juss.

1. SENECIO. Linn. *Groundsel, Ragwort, Fleawort*.

*Syngenesia Superflua*. L.

1. S. TENUIFOLIUS. Jacq. (Hoary R.) July, Aug. 4

The Var. *S. crucifolius* L., can be readily distinguished from *S. tenuifolius* Jacq., even when growing together, as they do in a field at Rock Ferry.—*H. Fisher*.

2. S. SARRACENICUS. L. (Broad-leaved G.) July—Aug. ☉

Arnstead, banks of the Mersey, near Warrington, plentiful.—*J. B. Wood*.

2. INULA. Linn. *Inula*.

1. I. CONYZA. L. (Ploughman's Spikenard.) July, Aug. 4

Between Sutton bridge and Sutton lock.—*J. Harrison*. Plentiful on the banks of the Mersey, above the dungeon at Hale.—*W. H.*

3. ANTHEMIS. Linn. *Chamomile*.

1. A. ARVENSIS. L. (Corn C.) June—Aug. ♂

Road side between Thornton Hayes and Parkgate.—*J. Shillitoe*. *J. D.*

2. A. NOBILIS. L. (Common C.) June—Sept. 4

Parr Flat, by the side of a pathway leading to Sutton Moss, abundant.—*J. Harrison*. September, 1851.

3. A. COTULA. L. (Stinking C.) June—Aug. ☉

Southport. Confirmed.—*J. D.*

ORD. XXII. CAMPANULACEÆ. Juss.

*The Bell-flower Family.*

1. CAMPANULA. Linn. *Bell-flower. Pentand. Monogyn.*

1. C. TRACHELIUM. L. (Nettle-leaved B.) June—Oct. 4

Specimens were brought to me in July, 1851, by Mr. J. Harrison, said to be gathered in Aston Wood, Aston, where he believes it to be indigenous.

2. C. HEDERACEA. L. (Ivy-leaved B.) July. 4

Lathom Park and Narrow Moss, near Ormskirk.—*T. Williams*.  
Very abundant in a hedge leading from Ormskirk (half a mile distant) to Halsall.

SUB-CLASS III. COROLLIFLORÆ.

(*Ord.* xxiii—xxx.)

ORD. XXIII. PYROLACEÆ. Lind.

*The Winter-green Family.*

1. PYROLA. Linn. *Winter-green. Decand. Monogyn.* L.

1. P. ROTUNDIFOLIA. L. (Round-leaved W.) July—Sept. 4

Crosby sand hills.—*J. Shillitoe*. Abundant at Lytham.—*J. B. W.*  
The Var. *B. bracteata* Hook. (*P. maritima* Ken.) is not very rare amongst the sand hills at Southport, Crosby, Halsall, &c.

ORD. XXIV. BORAGINACEÆ. De Cand.

*The Borage Family.*

1. MYOSOTIS. Linn. *Scorpion Grass. Pentand. Monogyn.*

1. M. SYLVATICA. Hoffm. (Upright Wood S.) May—Oct. 4

In a wood near Croxteth Hall.—*J. Shillitoe*.

ORD. XXV. OROBANCHACEÆ. Vent.

*The Broom-rape Family.*

1. OROBANCHE. Linn. *Broom-rape. Didyn. Angiospem.* L.

1. O. MAJOR. L. (?) (Greater B.) May—July. 4

On broom at Eastham.—*H. Fisher*.

ORD. XXVI. SCROPHULARIACEÆ. Juss.

*The Figwort Family.*

1. VERONICA. Linn. *Speedwell. Diand. Monogyn.* L.

1. V. POLITA. Fries. (Procumbent F.) April—Oct. ☉

Bidston road side, between the hill and the church.—*F. P. M.* Near Chester, Gressford, and Southport.—*J. B. W.*



ORD. XXVII. LABIATÆ. Juss. *The Labiate Family.*

1. MENTHA. Linn. *Mint. Didyn. Angiosperm.* L.

1. M. PULEGIUM. L. (Penny-royal.) August—Sept. 4  
Abundant on Newton Common, September, 1851.—*J. Harrison.*

2. M. GENTILIS. E.B. (Corn M.) August—Oct. 4  
Banks of the Mersey between Runcorn and Warrington.

2. GALEOBDOLOM. Huds. *Weasel-snout.*

1. G. LUTEUM. Huds. (Yellow W. or Archangel.) April—June. 4

Mr. J. Harrison brought me a specimen gathered by him (15th May, 1851), in Aston Wood, Aston, Cheshire; but I have had no opportunity of visiting the locality myself, nor have I heard of any one else seeing it grow thereabouts.

ORD. XXVIII. PRIMULACEÆ. Vent.

*The Primrose Family.*

1. CENTUNCULUS. Linn. *Chaffweed. Pentand. Monogyn.*

1. C. MINIMUS. L. (Small C. or Bastard Pimpernel.) June—August. ☉  
Abundant in sandy fields near Formby.—*J. Skillitoe.*

ORD. XXIX. PLUMBAGINACEÆ. Juss.

*The Leadwort Family.*

1. ARMERIA. Willd. *Thrift. Sea Pink. Pentand. Pentagyn.*

1. A. MARITIMA. Willd. (*Statice Armeria.* L.) (Common T. or S., or Sea-Gilliflower.) April—Sept. 4  
The varieties *A. scotica* Boiss. not rarely, and *A. pubescens* Link., are frequently found on the coast.

ORD. XXX. PLANTAGINACEÆ. Juss.

*The Plantain Family.*

1. PLANTAGO. Linn. *Plantain. Tetrand. Monogyn.* L.

1. P. MEDIA. L. (Hoary P.) June—Oct. 4

Knowsley Park, July, 1852.—*J. Skillitoe.* Hilbre Island, June, 1855.—*F. P. Marrat.* These habitats confirm Mr. H. C. Watson's expectations that this plant would be found in the Mersey district. (See Cybele.)

SUB-CLASS IV. MONOCHLAMYDEÆ.

(Ord. xxxi—xxxvi.)

ORD. XXXI. EMPETRACEÆ. Nutt.

*The Crowberry Family.*

1. EMPETRUM. Linn. *Crowberry. Diœc. Triand. L.*
1. E. NIGRUM. L. (Black C. or Crakeberry.) April—June. 24  
Fir-rough, Ormskirk.—T. Williams.

ORD. XXXII. THYMELACEÆ. Juss.

*The Daphne Family.*

1. DAPHNE. Linn. *Spurge Laurel. Octand. Monogyn. L.*
1. D. LAUREOLA. L. (Common S.) January—April. 2  
It is plentiful in hedges near Halewood, and abundant on the banks of the Mersey, near the Decoy, where some of my botanical friends believe it to be "truly indigenous."

ORD. XXXIV. CERATOPHYLLACEÆ. Gray.

*The Hornwort Family.*

1. CERATOPHYLLUM. Linn. *Hornwort.*  
*Monœcia. Polyand.*
1. C. DEMERSUM. L. (Common H.) July, August. 24  
Abundant on Formby Marsh.—J. Shillitoe. Plentiful in ditches at Southport.—J. B. Wood.
2. C. SUBMERSUM. L. (Unarmed H.) June, July. 24  
Mr. J. Shillitoe reports having found this plant in Altcar Marsh. Confirmation is desirable.

ORD. XXXV. URTICACEÆ. Juss. *The Nettle Family.*

1. PARIETARIA. Linn. *Pellitory of the Wall.*  
*Tetrand. Monogyn.*
1. P. OFFICINALIS. L. (Common P.) June—September. 24  
Abundant at Churchtown, near Southport.—J. B. W. Ruins of Burscough Abbey.—T. Williams.

ORD. XXXVI. SALICACEÆ. Rich. *The Willow Family.*

1. SALIX. Linn. *Willow. Sallow. Osier. Diæcia. Diand.* L.

1. S. FORBYANA. Sm. (Fine-basket O.) May. 24

Frequent at Halewood.—*W. Harrison.*

2. S. VITELLINA. L. (Yellow or Golden O.) May. 17

Frequent in moist woods, but probably in most cases planted.

3. S. SMITHIANA. Willd. (Silk-leaved O.) April, May. 17

Frequent in hedges in Halewood.—*W. Harrison.*

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CLASS II.

---

MONOCOTYLEDONOUS, OR ENDOGENOUS  
FLOWERING PLANTS.

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SUB-CLASS I. PETALOIDEÆ.

(Ord. xxxvii.—xliii.)

ORD. XXXVII. ORCHIDACEÆ. Juss. *The Orchis Family.*

1. LISTERA. Br. *Bird's Nest or Tway-blade.*

*Gynand. Monand.*

1. L. NIDUS-AVIS. Hook. (*Neottia.* L.) Common B. May,  
June. 24

Dean Wood, Upholland.—*J. Harrison.* Near Lathom Park.  
sparingly.—*T. Williams.*

SUPPLEMENT TO THE FLORA OF LIVERPOOL.

2. *L. CORDATA*. Br. (Heart-leaved T.) August. 4  
 Very sparingly on the banks of the Alt, below Altcar Marsh.—  
*T. Williams*.

2. *GYMNADENIA*. Br. *Gymnadenia*.

1. *G. CONOPSEA*. B. (Fragrant G.) June—August. 4  
 Upton, Cheshire.—*J. Shillitoe*.

3. *OPHRYS*. Linn. *Ophrys*.

1. *O. APIFERA*. Huds. (Bee O.) June, July. 4  
 This interesting plant was first discovered in this locality by Messrs.  
 W. Harrison and J. Shillitoe, in a small spot among the Crosby  
 Sand-hills, about half a mile north of the railway station. Here it  
 is rather plentiful.

ORD. XXXVIII. TRILLIACEÆ. De Cand.

*The Trillium Family.*

1. *PARIS*. Linn. *Herb. Paris*. *Octand. Tetrand.* L.  
 1. *P. QUADRIFOLIA*. L. (Common H.) May, June. 4  
 In a wood opposite the canal bank at Aston Park.—*J. Harrison*.  
 Plentiful in Bath Wood, near Ormskirk.—*T. Williams*.

ORD. XXXIX. LILIACEÆ. Juss. *The Lily Family.*

1. *ALLIUM*. Linn. *Onion. Leek. Garlic. Hexand. Monogyn.*  
 1. *A. VINEALE*. L. (Crow G.) June, July. 4  
 On sandy soil on the banks of the Mersey below Warrington (about four  
 miles) plentifully, with *A. arenarium*.—*J. B. Wood*. Hoylake.—*J.*  
*Shillitoe*.

ORD. XL. TYPHACEÆ. Juss.

*The Reed-mace Family.*

1. *TYPHA*. Linn. *Reed-mace or Cat's-tail. Monœcia Triand.* L.  
 1. *T. MINOR*. Sm.

I have carefully examined the specimen in the herbarium of the  
 Liverpool Botanic Garden, and believe it to be nothing more than  
 a very narrow-leaved variety of *T. angustifolia*. L. A similar  
 variety is found in a pond near Sutton, Cheshire.

ORD. XLI. NAIADACEÆ. JUSS. *The Pondweed Family.*

1. POTAMOGETON. Linn. *Pondweed. Triand. Tetragyn.* L.

1. P. LANCEOLATUS. Sm. (Lanceolate P.) July. 4

In a pond on Widow Garston's Farm, Sutton, near the Clock's face, July, 1851.—*J. Harrison.*

2. P. LUCENS. L. (Shining P.) June, July. 4

Formby Marsh.—*J. Shillitoe.*

ORD. XLII. CYPERACEÆ. JUSS. *The Sedge Family.*

1. BLYSMUS. Panz. *Blysmus. Triand. Monogyn.*

1. B. COMPRESSUS. Panz. (Broad-leaved B.) June, July. 4

The plant is rapidly becoming eradicated from the vicinity of Bootle Land Marks, but may yet be found not sparingly amongst the Crosby and Formby sand hills, and also at Southport, where I gathered it in July last.

2. B. RUFUS. Link. (Narrow-leaved B.) July. 4

Plentiful at Southport, but very dwarfish.

2. ELEOCHARIS. Br. *Spike-rush. Triand. Monogyn.* L.

1. E. MULTICAULIS. Sm. (Many-stalked S.) July. 4

Salt marsh between Southport and Ormskirk.—*T. Williams.*

3. SCIRPUS. Linn. *Club-rush. Bull-rush. Triand. Monogyn.* L.

1. S. SYLVATICUS. L. (Wood C.) July. 4

Dean Wood, Upholland.—*J. Harrison.* In a pit behind the Cranes. Lathom.—*T. Williams.*

4. CAREX. Linn. *Carex or Sedge. Monœcia Triand.*

1. C. CURTA. Gooden. (White C.) June. 4

Simmon's Wood Moss.—*J. Shillitoe.* Chat Moss, very common.—*J. B. Wood.* Blogue Moss, Lathom.—*T. Williams.*

2. C. ELONGATA. (Elongated C.) June. 4

"Plentiful about Warrington, and very common near Manchester." *J. B. Wood.* This is somewhat beyond our limit, yet the plant may probably be found nearer.

3. C. MURICATA. L. (Great Prickly C.) June, July. 4

Near Frodsham.—*J. B. Wood.*

4. C. LÆVIGATA. Sm. (Smooth-stalked beaked C.) June. 4

Plentiful in a wood near Knowsley Park.—*J. Shillitoe.*

5. *C. INTERMEDIA*. Gooden. (Soft brown C.) June. 24  
Plentiful and very large in ditches near Southport.—*J. B. Wood*.
6. *C. ACUTA*. L. (Slender-spiked C.) May. 24  
Plentiful on the banks of the Mersey near Runcorn.—*J. B. Wood*.
7. *C. STRICTA*. Gooden. (Tufted bog C.) March—May. 24  
Martin Mere, near Ormskirk.—*T. Williams*.
8. *C. PENDULA*. Huds. (Great pendulous C.) May, June. 24  
Aston Wood, Cheshire.—*J. Harrison*.
9. *C. VESICARIA*. L. (Short-beaked bladder C.) May, June. 24  
Between Runcorn and Warrington.—*J. B. Wood*.

ORD. XLIII. GRAMINACEÆ. JUSS. *The Grass Family*.

1. *ALOPECURUS*. Linn. *Fox-tail Grass*. Triand. *Digynia*. L.
1. *A. BULBOSUS*. L. (Tuberous F.) May—July. 24  
Ditch near Woodside, Cheshire.—*J. Shillitoe*. This requires confirmation.
2. *A. FULVUS*. Sm. (Orange-spiked F.) July. 24  
"Plentiful near Gresford."—*J. B. Wood*. This is out of our limit, and only inserted to stimulate investigation.
2. *POA*. Linn. *Meadow Grass*.
1. *P. AQUATICA*. L. (Reed M.) July—Aug. 24  
In a large pool, Runcorn limekiln, on the road to Rock Savage.—*J. Harrison*.
2. *P. LOLIACEA*. Huds. (*Triticum* Sm.) (Dwarf Wheat M.)  
June, July. ☉  
Plentiful in one spot on the shores of the Dee, near Parkgate.—*J. Shillitoe*. I have very fine specimens from this habitat.
3. *BROMUS*. Linn. *Brome Grass*.
1. *B. RACEMOSUS*. L. (Smooth B.) June and July. ☉ or ♂  
Bootle canal banks, near Water Works bridge, July, 1851.—*R. Tudor*.
2. *B. ARVENSIS*. L. (Taper Field B.) July, Aug. ☉  
Corn fields, Formby.—*J. Shillitoe*.
3. *B. COMMUTATUS*. Schrad. (Tumid Field B.) June—July.  
☉ or ♂  
Occasionally found in fields in Wirral and Lancashire.
4. *AVENA*. Linn. *Oat or Oat Grass*.
1. *A. FLAVESCENS*. L. (Yellow O.) July. 24  
Plentifully in fields about Frodsham and Runcorn.—*J. B. Wood*.  
New Brighton.—*J. Shillitoe*.

## CLASS III.

### ACOTYLEDONOUS, OR CELLULAR PLANTS.

#### SUB-CLASS I. ACROGENÆ, OR CORMOGENÆ.

##### FILICES.

*The Ferns and Fern Allies.*—(Ord. xlv.—xlv.)

#### ORD. XLIV. POLYPODIACEÆ. R. Br.

##### *The Polypody Family.*

##### 1. CETERACH. Willd. *Ceterach*.

##### 1. C. OFFICINARUM. Willd. (Common C.) Summer. 24

On an old stone wall three or four fields behind Billinge Beacon.—*J. Harrison, J. Shillitoe, and others.*

##### 2. POLYPODIUM. Linn. *Polypodium*.

##### 1. P. DRYOPTERIS. L. (Tender three-branched P.) Summer. 24

This beautiful fern grows in profusion on Upholland Hill, on a rocky bank near the Cross-keys public house.—*John Harrison, T. Williams.*

##### 2. P. PHAGOPTERIS. L. (Pale Mountain P.) Summer. 24

Steep bank near Carr mill dam, St. Helen's.—*Rev. H. H. Higgins.*

##### 3. ASPLENIUM. Linn. *Spleenwort*.

##### 1. A. TRICHOMANES. L. (Common Wall S.) Summer. 24

Plentiful on an old stone wall near Cross-keys, Upholland.—*J. Harrison.* Tawd Bridge, Latham Park.—*T. Williams.*

##### 2. A. ADIANTUM NIGRUM. L. (Black-stalked S.) June—Oct. 24

Plentiful on an old stone wall, with *Ceterach* offic., behind Billinge Beacon.—*J. Harrison.* Tawd Bridge, Latham.—*T. Williams.*

ORD. XLV. EQUISETACEÆ. De Cand.

*The Horse-tail Family.*

1. EQUISETUM. Linn. *Horse-tail.*

1. E. FLUVIATILE. L. (Great Water H.) April, May. 4

On the banks of the Mersey above the Decoy at Hale, plentiful, where it grows with stems five feet high.—W. H.

2. E. VARIEGATUM. Schleich. (Variegated Rough H.) June, July. 4

Southport.—J. B. Wood, J. D.

ALPHABETICAL INDEX

TO THE

FAMILIES AND GENERA.

	PAGE.		PAGE.
ACERACEÆ .....	7	Ceterach .....	22
Acer .....	7	Cheiranthus .....	4
ACOLYLEDONÆ .....	22	Cicuta .....	13
ACROGENÆ .....	22	CICHORACEÆ .....	13
Allium .....	19	Circœa .....	12
Alopecurus .....	21	Clematis .....	3
ALSINÆÆ .....	32	COMPOSITÆ .....	13
Anthemis .....	14	Conium .....	13
Aquilegia .....	20	CORMOGENÆ .....	22
Arenaria .....	7	COROLLIFLORÆ .....	15
Armeria .....	16	CORYMBIFERÆ .....	14
Asplenium .....	22	Crepis .....	13
Avena .....	21	CRUCIFERÆ .....	4
BERBERIDACEÆ .....	4	CUCURBITACEÆ .....	12
Berberis .....	4	CYNAROCEPHALÆ .....	14
Blysmus .....	20	CYPERACEÆ .....	20
BORAGINACEÆ .....	15	Daphne .....	17
Bromus .....	21	Diplotaxis .....	5
Bryonia .....	12	DIPSACEÆ .....	13
CALYCIFLORÆ .....	8	Dipsacus .....	13
Camelina .....	4	Eleocharis .....	20
Campanula .....	14	EMPETRACEÆ .....	17
CAMPANULACEÆ .....	14	Empetrum .....	17
Carex .....	20	Epilobium .....	11
CARYOPHYLLACEÆ .....	6	EQUISETACEÆ .....	23
Centaurea .....	14	Equisetum .....	23
Centunculus .....	16	Erodium .....	8
CERATOPHYLLACEÆ .....	17	Erysimum .....	5
Ceratophyllum .....	17	FILICES .....	22



# INDEX.

	PAGE.
Fragaria .....	11
Galeobdolon .....	16
GERANIACEÆ .....	8
Geranium .....	8
Geum .....	10
GRAMINACEÆ .....	21
GROSSULARIACEÆ .....	12
Gymnadenia .....	19
HALORAGACEÆ .....	12
HYPERICACEÆ .....	7
Hypericum .....	7
Inula .....	14
LABIATÆ .....	16
Lactuca .....	13
LEGUMINOSÆ .....	9
Lepidium .....	5
LILIACEÆ .....	19
Listera .....	18
Malachium .....	7
Meconopsis .....	4
Medicago .....	9
Melilotus .....	9
Mentha .....	16
MONOCHLAMYDEÆ .....	17
MONOCOTYLEDONÆ .....	18
Myosotis .....	15
Myriophyllum .....	12
Myrrhis .....	13
NAIADACEÆ .....	20
NOTORHIZEÆ .....	5
ONAGRACEÆ .....	11
Ophrys .....	19
ORCHIDACEÆ .....	18
Orobanchaceæ .....	15
Orobanche .....	15
Orthoplocææ .....	5
PAPAVERACEÆ .....	4
Parietaria .....	17
Paris .....	19
PETALOIDEÆ .....	18
PLANTAGINACEÆ .....	16
Plantago .....	16
PLUMBAGINACEÆ .....	16

	PAGE.
Polygala .....	6
POLYGALACEÆ .....	6
POLYPODIACEÆ .....	22
Polypodium .....	22
Potamogeton .....	20
Poterium .....	11
PRIMULACEÆ .....	16
PYROLACEÆ .....	15
RANUNCULACEÆ .....	3
Ranunculus .....	3
Beseda .....	5
RESEDACEÆ .....	5
RHAMNACEÆ .....	8
Rhamnus .....	8
Ribes .....	12
Rosa .....	11
ROSACEÆ .....	10
Rubus .....	10
Sagina .....	6
SALICACEÆ .....	18
Salix .....	18
Sanguisorba .....	11
Scirpus .....	20
SCROPHULARIACEÆ .....	15
Senecio .....	14
Silene .....	6
SILENEÆ .....	6
Stellaria .....	33
THALAMIFLORÆ .....	3
Thlaspi .....	4
THYMELACEÆ .....	17
Trifolium .....	9
Trigonella .....	9
TRILLIACEÆ .....	19
Turritis .....	4
Typha .....	19
TYPHACEÆ .....	19
Ulex .....	9
UMBELLIFERÆ .....	13
URTICACEÆ .....	17
Veronica .....	15
Viola .....	5
VIOLACEÆ .....	5

PROCEEDINGS  
OF THE  
LITERARY & PHILOSOPHICAL SOCIETY  
OF  
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DURING THE  
FORTY-FIFTH SESSION,  
1855—56.

No. X.



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# TABLE OF CONTENTS.

---

	PAGE.
List of Members .....	5
Annual Meeting .....	11
Election of Council and Officers.. ..	11
Report of Council.....	12
Table of Income and Expenditure, 1846—1855 inclusive .....	16
Treasurer's Accounts .....	18
Extraordinary Meetings .....	19, 50, 66
Ordinary Meetings .....	19, 28, 44, 50, 66, 67, 77, 107, 111, 117, 130, 138, 148
Death of Joseph Brooks Yates, Esq. ....	66
Papers read : Archer, T. C., Esq., On the useful products of the Palmaceæ..	19
Robberds, Rev. J., B.A., Poetry and its Application to Common Life.....	29
Rundell, W. W., Esq., On Magnetic Variation, and the Pro- ceedings of the Compass Committee .....	44
Higgins, Rev. H. H., M.A., On the Cultivation of Mosses ...	45
McAndrew, Robert, Esq., F.R.S., Notes on a Dredging Excur- sion to the North Cape .....	51
Towson, J. T., Esq., On the Instruments used by the Compass Committee .....	67
Morton, Mr. G. H., On the Sub-divisions of the New Red Sandstone, between the river Dee and the up-throw of the Coal Measures east of Liverpool .....	68
Towson, J. T., Esq., On additional Observations on Ice Impedi- ments to Australian Voyages .....	76
Ihne, Dr., A Plea for the Emperor Tiberius .....	77
Archer, T. C., Esq., On the Useful Products of the Graminaceæ 107	
Brooke, Richard, Esq., F.S.A., Upon the Extraordinary and Abrupt Changes of Fortune of Jasper, Earl of Pembroke, in the Fifteenth Century .....	111
Pedigree of the same.....	113

	PAGE.
Papers read: Evans, H. S., Esq., F.C.S., and N. Samuelson, Esq., F.C.S., On the Adulteration of Food .....	117
Redish, J. C., Esq., On some of the Mental and Social Phenomena of the Day, with their Poetical Solution, as illustrated by Tennyson's "Maud" .....	131
Hamilton, George, Esq., F.C.S., F.R.A.S., On the Preservation of Fresh Meats.....	138
Millward, Charles, Esq., On Constantine Palæogus, the last of Byzantine Emperors .....	147
Bretherton, Edward, Esq., F.G.S., A Geological Ramble ....	148
Donations .....	163

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#### CORRIGENDA IN LIST OF MEMBERS,

In the Council, (page 5,) *for* the Rev. A. Fischel (gone abroad), *read* Dr. Thomas Inman, (elected since the printing.)

In the List of Members, (pp. 7, 8, 9,) erase the names of the Rev. Dr. Buckland, Dr. Cohen, Rev. H. Griffiths, Mr. George Hunt, Mr. Joseph King, Jun., Mr. W. Lassell, Jun., Lieut. Lord, Mr. George Melly, Dr. Mitchell, Dr. Ramsay, Mr. John Roberts, Mr. W. W. Rundell, Mr. J. O. Ryder, and Mr. C. F. Salt.

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MEMBERS OF THE SOCIETY  
AT THE CLOSE OF  
THE SESSION XLV., 1855-56.

---

COUNCIL:

ROBERT M'ANDREW, F.R.S., F.L.S., *President.*

WILLIAM IHNE, PH.D., *Vice-President.*

JOSEPH DICKINSON, M.D., F.R.S., *Vice-President.*

THOMAS CROXON ARCHER, *Vice-President.*

ISAAC BYERLEY, M.R.C.S.E., F.L.S., *Treasurer.*

DAVID P. THOMSON, M.D., *Hon. Secretary.*

SWINTON BOULT.

REV. H. H. HIGGINS, M.A., F.C.P.S.

JOHN B. EDWARDS, PH.D., F.C.S.

REV. A. RAMSAY, M.A.

F. W. BLOXAM.

F. ARCHER, M.R.C.S.E.

A. HIGGINSON, M.R.C.S.E.

ED. BRETHERTON, F.G.S.

REV. A. FISCHER.

ORDINARY MEMBERS.

---

*Elected.*

1833 Aikin, James, 1, *Goree Piazzas, and 1, Alfred-street.*

1851 Anderson, Robert Worrall, 23, *Falkner-square.*

1841 Anderson, Thomas Francis, 3, *Cable-street, and Holly-lodge, Fairfield.*

1854 Andrew, John, 20, *Fenwick-street, and Sandown-park, Wavertree.*

1844 Archer, Francis, M.R.C.S.E., *Corresp. Mem. Nat. Hist. SS. Boston and Belfast, 49, Rodney-street.*

1853 Archer, Thomas Croxon, *Lect. on Botany Liverp. Sch. of Medicine, Revenue-buildings, and Higher Tranmere.*

1854 Atkin, George, 60, *Cable-street, and Falkner-street.*

1854 Bahr, George W., 4, *Cable-street, and South-hill Grove, Aigburth.*

1834 Baines, Thomas, *Castle-street, Oakfield, and Little Woolton.*

1851 Bean, William, *Revenue-buildings, and 91, Wellington-road.*

1850 Behrend, Henry, M.R.C.S.E., 15, *Canning-street.*

1854 Bennett, William, 109, *Shaw-street.*

## Elected.

- 1812 Bickersteth, Robert, Hon. F.R.C.S.E., Cons. Surg. Liverp. Royal Infirmary, 2, *Rodney-street*.
- 1856 Bird, William Valentine, M.D.Aberd., 2, *Beaufort-terrace, Seacombe*.
- 1848 Bishop, Rev. Francis, 7, *High Park-street*.
- 1847 Bloxam, Fred. William, *London*.
- 1855 Böhtlingk, Alex., 9, *Rumford-place, and 63, Kensington*.
- 1834 Boulton, Francis, Jun., *Water-street, and Clifton-park*.
- 1835 Boulton, Swinton, 37, *Castle-street*.
- 1854 Bretherton, Edward, F.G.S., 49, *North John-street, and 47, Hamilton-square, Birkenhead*.
- 1852 Brewer, John, Barrister-at-Law, 1, *South John-street*.
- 1844 Bright, Samuel, 1, *North John-street, and Sandheys, Mill-lane, West Derby*.
- 1855 Brockholes, James Fitzherbert, 7, *Egerton-street, Birkenhead*.
- 1855 Brooke, Richard, F.S.A., 16, *Canning-street*.
- 1851 Brougham, James Rigg, Barrister-at-Law, Reg. Court of Bankr., 14b, *South John-street*.
- 1848 Byerley, Isaac, F.L.S., M.R.C.S.E., *Myrtle Cottage, Seacombe*.
- 1848 Casey, George, *Naylor-street, and Elmfield, Walton*.
- 1851 Clare, John Leigh, 11, *Exchange-buildings, and 11, Richmond-terrace, Breck-road*.
- 1844 Clay, Robert, 38, *Saint Anne-street*.
- 1853 Cohen, Douglas, M.D.Edin., L.R.C.S.E., 4, *Great George-square*.
- 1850 Cox, Henry, 15, *Exchange-alley North, and Spring-bank, Walton-breck*.
- 1856 Cunningham, John, F.G.S., 5, *Cook-street, and Egremont*.
- 1844 Dale, Robert Norris, *Oldhall-street, and 1, Richmond-terrace, Breck-road*.
- 1856 Danson, John Towne, F.S.S., Barrister-at-law, *Carnsdale Farm, Barnston, Birkenhead*.
- 1848 De Finance, Gabriel, 39, *North Bedford-street*.
- 1840 Dickinson, Joseph, M.A. and M.D. Trin. Coll. Dub. and Cantab, F.R.S., M.R.I.A., F.L.S., F.B.S.E., Phys. to Liverpool Royal Infirmary, 11, *Nelson-street, Great George-square*.
- 1848 Dove, Percy Matthew, F.S.S., 1, *North John-street, and 49, Hamilton-square, Birkenhead*.
- 1848 Drysdale, John James, M.D.Edin., L.R.C.S.E., 44, *Rodney-street*.
- 1856 Duckworth, Henry, 3, *Canning-street*.
- 1836 Duncan, William Henry, M.D.Edin., Medical Officer of Health, 2, *Cornwallis-street, and 17, Peel-terrace, Falkner-square*.
- 1833 Eden, Thomas, M.R.C.S.E., *Dingle-hill, Park-road*.
- 1848 Edwards, John Baker, Ph.D.Gies., F.C.S., Lect. on Chem. Liverp. Sch. of Med., 42, *Berry-street, and 7, Church-street, Birkenhead*.
- 1844 Ellison, King, F.R.C.S.E., 30, *Rodney-street*.
- 1850 Evans, Henry Sugden, F.C.S., 52A, *Hanover-street, and 45, Bridge-street, Birkenhead*.
- 1846 Faram, John, 8, *Railway-cottages, Edge-hill*.
- 1852 Ferguson, William, F.L.S., F.G.S., *Gresham House, Old Broad-street, London*.
- 1855 Finlayson, Alexander, 6, *New Quay*.
- 1852 Fischel, Rev. A., 4, *Great George-square*.
- 1849 Fisher, William M'Naught, Ph.D., F.R.A.S., 39, *Great George-street*.
- 1837 Fletcher, Edward, 3, *India-buildings*.
- 1854 Fletcher, Fred. Dicker, M.R.C.S.E., Lect. on Anat. and Phys. Liverp. Sch. of Med., 1, *Mornington-terrace*.
- 1855 Foard, J. F., 34, *Church-street*.

## Elected.

- 1854 Gee, Robert, M.D.Heidelb., M.R.C.S.F., 10, *Oxford-street*.  
 1853 Godden, Joseph, M.R.C.S.E., *Oxton, Cheshire*.  
 1855 Goodwin, Joseph, *Seacombe*.  
 1856 Grainger, John, B.A., 32, *Canning-street*.  
 1844 Gray, Thomas, 1, *North John-street*, and 9, *Northumberland-terrace, Everton*.  
 1853 Greenwood, Henry, 16, *Canning-place*, and 12, *Fairfield Crescent, Prospect Vale, Fairfield*.  
 1854 Griffiths, Rev. Henry, 3, *Montpellier-terrace, Upper Parliament-street*.  
 1855 Hakes, James, M.R.C.S.E., Surg. North. Hosp., 12, *Maryland-street*.  
 1850 Hamilton, George, F.R.A.S., F.C.S., *Blackburn House, Hope-street*, and 1, *Wellington-road, North Egremont*.  
 1856 Hardman, Lawrence, *York Buildings, Dale-street*, and *Rock Park, Rock Ferry*.  
 1837 Hartley, John Bernard, *Coburg-dock*, and *Mosley-hill*.  
 1841 Heath, Edward, *Orange-court, Castle-street*, and *St. Domingo-grove*, 10, *Breckfield-road, Everton*.  
 1855 Hess, Ralph, 3, *Mornington-terrace*.  
 1846 Higgins, Rev. H. H., M.A.Cantab., F.C.P.S., *Rainhill*.  
 1836 Higginson, Alfred, M.R.C.S.E., 44, *Upper Parliament-street*.  
 1850 Hodson, Thomas Llewellyn, M.R.C.S.E., 39, *Islington*.  
 1854 Holland, Charles, 17, *Tower Buildings North*, and *Liscard Vale, Egremont*.  
 1852 Holt, Alfred, 1, *India-buildings*, and 2, *Rake-lane, Edge-hill*.  
 1849 Holt, George, Jun., *Water-street*, and 2, *Rake-lane, Edge-hill*.  
 1847 Horner, Henry P., *Bassnett-street*, and 7, *Everton-road*.  
 1850 Howson, Rev. John Saul, M.A.Trin. Coll. Cantab., Principal of the Collegiate Institution, 4, *South Hill-street*.  
 1841 Hume, Rev. Abraham, D.C.L.Dub. and Cant., LL.D.Glasg., F.S.A., M.P.S., Corresp. F.S.A.Scot., 9, *Clarence-street, Everton*.  
 1851 Hunt, George, *Handsworth, near Birmingham*.  
 1854 Hunter, John, Memb. Hist. Soc. of Pennsylvania, 12, *Exchange-street East*, and 1, *Mersey-view, Seacombe*.  
 1851 Hutchinson, Richard, M.R.C.S.E., *Upper Parliament-street*.  
 1850 Ihne, William, Ph.D.Bonn, 6, *Carlton-terrace, Upper Parliament-street*.  
 1844 Inman, Thomas, M.D.Lond., M.R.C.S.E., F.B.S.E., Lect. on Princip. and Pract. of Med. Liverp. Sch. of Med., Phys. to Northern Hosp., 16, *Rodney-street*.  
 1854 Jones, John, 34, *Chapel-street*.  
 1852 Jones, Morris Charles, 3, *Harrington-street*, and 75, *Shaw-street*.  
 1851 Jones, Roger Lyon, 1, *Great George-square*.  
 1855 King, Alfred, *Newington*, and 1, *Netherfield-road South*.  
 1846 King, Joseph, Jun., 3 *Union-court*, and 59, *Shaw-street*.  
 1854 Kirwan, Charles, L.R.C.S.I., 1, *Upper Parliament-street*.  
 1848 Lampport, William James, *Water-street*, and 5, *Beech-terrace, Fairfield*.  
 1839 Lassell, William, F.R.S.S.L. and E., F.R.A.S., 20, *Milton-street*, and *Broadstones, Sandfield Park, West Derby*.  
 1852 Lassell, William, Jun., 20, *Milton-street*.  
 1844 Lear, John, 1, *North John-street*, and 11, *Holland-terrace, Edge-hill*.  
 1854 Lidderdale, William, 42, *Canning-street*.  
 1844 Lord, William, Lieut. R.N., 16, *Sandon-street*.



## Elected.

- 1834 McAndrew, Robert, F.R.S., F.L.S., *Allhallows Chambers, Lombard-street, London.*
- 1856 McCann, James, F.G.S., 16, *Irvine-street, Edge-hill.*
- 1855 Mackinlay, Daniel, 67, *Cornwallis-street.*
- 1854 McIlveen, Alexander, Princip. Liverp. Inst., 9, *Sandon-terrace.*
- 1852 Macleod, Norman, F.R.A.S., 8, *Peel-street.*
- 1853 McNicholl, Thos., 32, *Crown-street.*
- 1853 Marrat, Frederick Price, 15, *White Mill-street.*
- 1848 Marshall, Buchanan, M.D.Glasgow, 29, *Islington-terrace.*
- 1839 Martin, Studley, *Exchange-chambers, and 3, Chesterfield-street.*
- 1844 Mayer, Joseph, F.S.A., F.R.A.S., F.E.S., &c., 68, *Lord-street.*
- 1854 Melly, George, 7, *Water-street, and 5, Bedford-street South.*
- 1854 Millward, Charles, 14, *Dentworth-street, Everton.*
- 1853 Milner, Rev. J. W., M.A., 1, *Devonshire-terrace, Upper Parliament-street.*
- 1854 Mitchell, Thomas R., M.D.St. And., F.R.C.S.I., 12, *Great George-sq.*
- 1855 Morton, George H., 5, *London-road.*
- 1849 Moss, Rev. John James, B.A., *Upton, Cheshire.*
- 1850 Mott, Albert Julius, *South Castle-street, and 41, Prospect-vale, Fairfield.*
- 1854 Mott, Charles Grey, 7, *Argyle-street, Birkenhead, and 2, Parliament-terrace, Upper Parliament-street.*
- 1834 Neill, Hugh, L.R.C.S.E., F.R.A.S., 115, *Mount-pleasant.*
- 1851 Newlands, James, Borough Engineer, 2, *Cornwallis-street, and 2, Clare-terrace, Duke-street North, Edge-hill.*
- 1847 Nisbet, William, L.Fac.P. and S.G., *Church-street, Egremont.*
- 1855 North, Alfred, 33, *Huskisson-street.*
- 1853 Pearse, W. H., M.D., 1, *Upper Parliament-street.*
- 1846 Picton, James Allanson, F.S.A., 19, *Clayton-square, and Sandy-knowe, Wavertree.*
- 1854 Prange, F., 12, *Dale-street, and 2, Grove Park, Lodge-lane.*
- 1850 Ramsay, Rev. Arthur, M.A.Trin. Coll. Cantab., *Hayman's Green.*
- 1844 Ramsay, Peter, M.D.St.And., F.R.C.P.E., M.R.C.S.E., Surg. R.N., 69, *Chatham-street.*
- 1812 Rathbone, Richard, 24, *Water-street, and Woodcote, Aigburth-road.*
- 1812 Rathbone, William, 24, *Water-street, and Greenbank, Wavertree.*
- 1856 Rawlins, Charles Ed., Jun., 4, *Temple-street, and Windermere-terrace, Prince's-park.*
- 1851 Redish, Joseph Carter, 18, *Chapel-street.*
- 1854 Rees, William, 28, *West Derby-street.*
- 1854 Rigge, Thomas, 64, *Rodney-street.*
- 1840 Robberds, Rev. John, B.A., 4, *High-park-street, Toxteth-park.*
- 1854 Roberts, John, 53, *Hope-street.*
- 1853 Rowe, James, 2, *Chapel-walks, and Eaton Cottage, Woolton-road, Wavertree.*
- 1856 Rudd, Henry Vittoria, 2, *King-street, and 94, Chatham-street.*
- 1855 Rundell, W. W., Sec. Liverp. Comp. Com., 40, *Tower-buildings.*
- 1850 Ryder, James O., 1, *Fenwick-street, and 39, Falkner-square.*
- 1836 Salt, Charles Frederick, 100, *Falkner-street.*
- 1856 Salusbury, Sir John S.P., *Priory-street, Birkenhead.*
- 1856 Samuelson, Newton, F.C.S., 3, *Hackin's-key.*
- 1846 Scholfeld, Henry Daniel, M.D.Oxon, M.R.C.S.E., 14, *Hamilton-square, Birkenhead.*
- 1853 Shain, James Miller, M.R.C.S.E., 4, *Monument-place, London-road.*
- 1854 Slack, Henry Wright, M.R.C.S.E., 25, *Islington-terrace.*
- 1812 Smith, James Houlbrooke, 28, *Rodney-street, and Green-hill, Allerton.*

## Elected.

- 1848 Smith, John Peter George, *Borough Bank, Water-street, and Spring-bank, 47, Breck-road, Everton.*
- 1853 Sommers, John Augustus, L.R.C.S.E., 25, *Wilton-street.*
- 1855 Taylor, John Stopford, M.D.Aberd., M.R.G.S., 1, *Springfield.*
- 1842 Taylor, Robert Hibbert, M.D.Edin., L.R.C.S.E., F.B.S.E., Lect. on Ophthalm. Med. Liverp. Sch. of Med., *Percy-street.*
- 1854 Thompson, Samuel Henry, *Thingwall-hall, Knotty Ash.*
- 1849 Thomson, David Purdie, M.D.Edin., L.R.C.S.E., 4, *Salisbury-street.*
- 1812 Thorneley, Thomas, M.P., 8, *Mount-street.*
- 1851 Towson, John Thomas, Scient. Examiner of Masters and Mates, *Sailors' Home, and 47, Upper Parliament-street.*
- 1844 Turnbull, James, M.D.Edin., Phys. Liverp. Roy. Infirmary, 4, *Mornington-terrace.*
- 1844 Vose, James Richard White, M.D.Edin., Sen. Phys. Liverp. Roy. Infirmary, 5, *Gambier-terrace.*
- 1844 Walmsley, Joshua, 50, *Lord-street.*
- 1849 Watling, John William Henry, M.R.C.S.E., *Wavertree.*
- 1855 Wilks, W. G., 1, *North John-street, and 14, Everton-road.*
- 1844 Winstanley, Samuel, *Chus ch-street, and 2, Gambier-terrace.*
- 1855 Wybergh, John, jun., Clerk to Magistrates, *Sessions-house, and Church-road, Seaforth.*
- 1834 Yates, Richard Vaughan, *The Shrubbery, Aigburth-road.*

*Note.*—The proposals of the following Gentlemen lie before the Society : Dr. Nevins, Rev. J. Herbert Jones, M.A., Mr. James McAndrew, and Mr. Joseph Ariano, Jun.

## CORRESPONDING MEMBERS.

## Elected.

- 1812 Peter Mark Roget, M.D.Edin., F.R.C.P., F.R.S., F.G.S., F.R.A.S. M.R.G.S., &c., *London.*
- 1813 Very Rev. William Buckland, D.D.Oxon., F.R.S., F.L.S., F.G.S. M.R.G.S., Hon. F.C.P.S., Dean of Westminster, *Deanery, Westminster.*
- 1815 George Cumming, M.D.Edin., L.R.C.P., *Denbigh.*
- 1819 John Stanley, M.D.Edin., *Whitehaven.*
- 1819 and 1825 Rev. W. Scoresby, D.D., F.R.S.S.L. and E., Member of the Institute of France; of the American Institute, Philadelphia, &c.
- 1820 Joseph Carne, F.R.S., M.R.I.A., F.G.S., &c., *Penzance, Cornwall.*
- 1828 Rev. Brook Aspland, *Duckinfield, Cheshire.*
- John Ashton Yates, M.R.G.S., *Bryanston-square, London.*
- 1833 Thomas Stewart Trail, M.D.Edin., F.R.C.P.E., F.R.S.E., F.G.S., &c., *Edinburgh University.*
- 1833 The Right Hon. the Earl of Harrowby, P.C., D.C.L., F.R.S., *Sandon-hall, Staffordshire, and 39, Grosvenor-square, London.*
- 1833 James Yates, M.A., F.R.S., F.L.S., F.G.S., &c., *Lauderdale-house, Highgate, London.*
- 1835 George Patten, A.R.A., *London.*
- 1835 William Ewart, M.P., *Cambridge-square, Hyde-park, London.*

## Elected.

- 1835 Lord Brougham and Vaux, M.A., F.R.S., &c., &c., &c.  
 1835 The Right Hon. the Earl of Ellesmere, K.G., D.C.L., F.R.S., F.G.S., F.L.S., F.S.A., *Worsley Hall, Lancashire, and 18, Belgrave-square, London.*  
 1836 Chevalier de Kirkhoff, *Antwerp.*  
 1837 The Right Hon. the Earl of Burlington, M.A., LL.D., F.R.S., M.R.I.A., F.G.S., M.R.G.S., F.C.P.S., F.Z.S., Chan. Univ. Lond., *Belgrave-square, London.*  
 1838 Professor Airey, M.A., D.C.L., F.R.S., Hon. F.R.S.E., Hon. M.R.I.A., F.R.A.S., F.C.P.S., &c., Astronomer Royal, Greenwich.  
 1840 James Naysmith, *Patricroft.*  
 1840 Richard Duncan Mackintosh, L.R.C.P., *Exeter, Devonshire.*  
 1841 Charles Bryce, M.D.Glasg., Fell. F.P. and S.Glasg., Socio dell' Accad. de Lin. Roma., *Ludlow.*  
 1844 J. Beete Jukes, M.A., F.R.S., M.R.I.A., F.G.S., Local Director of the Geological Survey of Ireland, *Dublin.*  
 1844 T. B. Hall, *London.*  
 1844 Peter Rylands, *Warrington.*  
 1844 John Scouler, M.D., LL.D., F.L.S., Prof. Nat. Hist. Dublin Royal Society.  
 1844 Thomas Rymer Jones, F.R.S., F.Z.S., F.L.S., M.R.C.S.E., &c., *King's College, London.*  
 1844 Robert Patterson, *Belfast.*  
 1844 Signor L. Bellardi, *Turin.*  
 1844 Signor Michelotti, *Turin.*  
 1844 Thomas Bell Salter, M.D.Edin., M.R.C.S.Eng. and Edin., F.L.S., F.B.S.E., *Ryde, Isle of Wight.*  
 1844 Professor Alger, *Boston, U.S.*  
 1844 Sir Charles Lemon, Bart., M.A.Cantab., F.R.S., F.G.S., *Cardew, Cornwall.*  
 1844 Il Cavaliere Carlo Passerini, *Pisa.*  
 1844 William Carpenter, M.D.Edin., M.R.C.S.E., F.R.S., F.G.S., *London University.*  
 1846 Rev. Baden Powell, M.A.Oxon., F.R.S., F.R.A.S., F.G.S., &c., *Oxford University.*  
 1847 Sir William Rowan Hamilton, LL.D., Hon. F.R.S.E., M.R.I.A., F.R.A.S., F.C.P.S., Astronomer Royal of Ireland, *Dublin.*  
 1849 Thomas Nuttall, F.L.S., *Rainhill, Lancashire.*  
 1849 Rev. Thomas Corser, M.A., *Stand, Bury.*  
 1850 Rev. St. Vincent Beechey, M.A.Cantab., *Worsley, near Eccles.*  
 1851 James Smith, F.R.S.S.L. and E., F.G.S., &c., *Jordan-hill, Glasgow.*  
 1851 Henry Clarke Pidgeon, *London.*  
 1851 Rev. Robert Bickersteth Mayor, M.A.Cantab., Fell. St. John's Coll. Cantab., F.C.P.S., *Rugby.*  
 1852 Thomas Spencer, *London.*  
 1852 William Reynolds, M.D., *Coed-du, Denbighshire.*  
 1853 Rev. James Booth, LL.D., F.R.S., &c., *Wandsworth, Surrey.*

PROCEEDINGS  
OF THE  
LITERARY AND PHILOSOPHICAL SOCIETY  
OF LIVERPOOL.

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SESSION FORTY-FIVE, 1855-6.

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ANNUAL MEETING.

ROYAL INSTITUTION.—October 15th, 1855.

JOSEPH DICKINSON, Esq., M A., M.D., F.R.S., F.L.S.,  
PRESIDENT, in the Chair.

Messrs. Alfred North, Joseph Goodwin, W. W. Rundell, and W. G. Wilks, were elected Ordinary Members.

A number of African Curiosities were exhibited by Mr. Consul Hutchinson.

The Report of the Council was read, and upon the motion of the Rev. Dr. Hume, was unanimously adopted; and the Treasurer's Accounts were submitted and passed—(see pp. 12, 18.)

The President's period of office having expired, the Society duly elected to that office Robert M'Andrew, Esq., F.R.S., F.L.S.

Five new members of Council were balloted for, viz.: the Rev. A. Ramsay, M.A.: Mr. F. W. Bloxam, Mr. F. Archer, Mr. A. Higginson, and Mr. Edward Bretherton, F.G.S.; and nine others were then elected, viz.: Dr. Dickinson, Dr. Ihne, Mr. Isaac Byerley, F.L.S., Dr. Thomson, J. B. Yates, Esq., Mr. S. Boulton, Mr. T. C. Archer, Rev. H. H. Higgins, M.A., and Dr. Edwards.

The officers were then chosen, viz.: Dr. Ihne, Mr. J. B. Yates, and Dr. Dickinson, Vice-Presidents; Mr. Byerley, Treasurer; and Dr. Thomson, Hon. Secretary.

The retiring President having left the chair, a vote of thanks was carried by acclamation for the services which he had rendered during his period of office.

The following recommendations of the Council were then put and

carried, subject to a second vote at an extraordinary meeting following:—"That the annual subscription be raised to one guinea; that until January, 1856, members may compound for all future payments by making one payment of £5 5s. exclusive of entrance fee; but that after that period the life composition shall be £10 10s. including the entrance fee paid by new members;" and "That the list of Corresponding Members be limited to fifty."

#### ANNUAL REPORT.

YOUR Society has lost from death and other causes ten Ordinary and two Corresponding Members, viz.: Dr. Macrorie, Messrs. Cauty, Enoch Harvey, Aspinall, Baldy, S. Higgins, J. Keates, F. Thornley, W. Jevons, Dr. Balman. It has enrolled twenty-two new Ordinary members, viz.: Messrs. Charles Holland, John Hunter, Edward Bretherton, Henry W. Slack, Samuel H. Thompson, Alexander M'Ilveen, Dr. Mitchell, Messrs. Charles Millward, G. H. Puckle, M.A., Rev. H. Griffiths, Messrs. John Andrew, John Roberts, James F. Brockholes, George H. Morton, George Atkin, James Hakes, A. Finlayson, John Wybergh, jun., Frederick Potts, Dr. J. S. Taylor, Messrs. Alfred King, and J. F. Foard.

The members enrolled at the present time are one hundred and forty-eight Ordinary and forty-five Corresponding.

Early in the session your Society had to mourn the loss of that distinguished naturalist, Professor Edward Forbes, whose unexpected death filled us with the profoundest grief; now you have to lament the loss of Dr. George Johnston, of Berwick-upon-Tweed, from the list of Corresponding Members. His warm attachment to natural history pursuits, and the valuable aid rendered by his writings, make his death a subject of deep regret to the scientific world generally, while this Society has to deplore, in the event, the removal of one who evinced a lively interest in its welfare.

The reduction of the list of Corresponding Members, made during the past session, leads your Council to recommend that the number should be limited to fifty; and you will be called upon to deliberate on this question.

The accession of new members has been accompanied by increased interest in the proceedings of your Society generally, as has been evinced by expressions from without, as well as by numerous attended meetings.

Your Council have the gratification of reporting, that the ninth volume of "Proceedings" is already in the hands of members. Early in the same session the eighth volume was issued, and your Council

believe that the reputation of the Society was thereby increased and widened.

The natural history of the locality has long and actively engaged the attention of your Society, and the Council review with gratitude the labours of the members, persuaded as they are, that they best fulfil a primary duty entrusted to them in fostering such pursuits and placing the results in type. And they look back with unfeigned pleasure at the publication of the Meteorological Observations taken at the Liverpool Observatory, together with the Flora and Fauna of the district. They believe that they have acted wisely in printing these valuable communications as *appendices*, thereby enabling members to bind up the individual monographs on our local natural history in one comprehensive volume. By these publications the Society, in its own sphere, has done what it could, and has made a valuable addition to the scientific literature of the country.

Besides many important communications made to the Society, the following papers were read at the ordinary meetings :—

October 30, 1854.—“On Magnetism and the Compass-guidance of Iron Ships,” by the Rev. Dr. Scoresby, F.R.S.S.L. and E., &c., &c.

November 18 and 27.—“On the Resources of Russia,” by Dr. Ihne.

December 11.—“On the Personal Character and Scientific Labours of the late Dr. Dalton,” by the Rev. J. Robberds, B.A.

January 8, 1855.—“On Spontaneous Combustion, and Suggestions for Extinguishing Fire,” by Dr. Inman.

January 22.—“First Series of Observations on the Phenomena of Smell,” by T. C. Archer, Esq.

February 5.—“On the Solar Ray,” by J. T. Towson, Esq.

February 19.—“On Photography, with Special Reference to the Chymical Distinction between the Collodion and Paper Processes,” by Dr. Edwards.

March 5.—“On the Blasting of Rocks,” by W. Nisbet, Esq.

March 19 and April 16.—“On the Present State of the Question of Compass Disturbance and Mode of Adjustment in Iron Ships, and the difficulty of dealing with it,” by the Rev. Dr. Scoresby.

April 16.—“On the Mosses and Hepaticæ found within twelve miles of Liverpool and Southport,” by Mr. Marrat.

April 30.—“On Trade and Partnership: the Relative Duties and Proper Liabilities of the Merchant and the State,” by S. Boulton, Esq.

May 14.—“Additions to the Flora of Liverpool,” by Dr. Dickinson.

May 14.—“On the Meaning and History of Surnames,” by the Rev. A. Ramsey, M.A.

May 28.—“Anthropology of the Filatahs,” by T. J. Hutchinson, Esq.

"On Ice Impediments to Australian Voyages," by J. T. Towson, Esq.  
 "On Certain New and Rare Products of the Vegetable Kingdom," by  
 T. C. Archer, Esq.

The donations to your Society, made between the month of June, 1854, and the same month, 1855, have been entered in your minutes, received your thanks, and been acknowledged in the ninth volume of "Proceedings." They may be thus enumerated:—

October 16, 1854.—"Lectures on Quaternions," by Sir W. R. Hamilton, from the Author; "Proceedings and Papers of the Historic Society of Lancashire and Cheshire, Session VI," from the Society; "Notices of Meetings of Members of the Royal Institution of Great Britain, Part XI," from the Royal Institution, Albermarle-street, London; "Twenty-first Annual Report of the Royal Cornwall Polytechnic Society, 1833," from the Society; "Monthly Notices of the Royal Astronomical Society," Vol. XIV. Nos. 6 and 8, from the Society, October, 30.—"Siluria," by Sir Roderick J. Murchison, from the Author; "Monthly Notices of the Royal Astronomical Society," Vol. XIV. No. 9, from the Society. November 27.—"Report of the Council of the Historic Society of Lancashire and Cheshire," from the Society. December 11.—"Sixth Annual Report of the Free Public Library and Museum, at Salford," from the Committee; "Notices of the Royal Astronomical Society," Vol. XV. No. 1, from the Society; "New Theories of the Universe," by Dr. James Bedford, from the Author; "Natural History of the Eastern Borders," Vol. I., Botany, by Dr. George Johnston, from the Author. January 8, 1855.—"Tyneside Naturalists' Field Club Transactions," three parts, from the Club; "Seven Letters on the Estuary of the Mersey," by Joseph Boulton, Esq., from the Author; "Report of the Botanical Society of London," from the Society; "Remarks on the Letter of the Medical Relief Committee to the General Board of Health," by Dr. Duncan, from the Author. January 22.—"Journal of the Archæological and Historic Society of Chester," from the beginning, Parts 1, 2, and 3, from the Society. February 5.—"Proceedings of the Royal Society of Edinburgh, Session 1853-54," from the Society. February 19.—"Notices of the Royal Astronomical Society," from the Society; Laws and List of Members of the Historic Society of Lancashire and Cheshire, from the Society; Duplicate Copies of the same on the 28th of May. March 19.—"Journal of the Geological Society of Dublin," Vol. IV., Part 2, No. 2, and Vol. VI., Part 1, from the Society; "Monthly Notices of the Royal Astronomical Society," Vol. XV., No. 4, from the Society; "Report of the Royal Institution of Liverpool," from the Council of the Institution. April 16.—"On Spontaneous Combustion," by Dr. Inman, from the Author; "Monthly Notices of

the Royal Astronomical Society," Vol. XV., No. 5, from the Society; "Letter to Mr. Urban, on the Complutensian Polyglot," by Mr. Grienfield, from the Author; "On the Human Hair," from Mr. Rowland. April 30.—"On the Rights and Jurisdiction of the County Palatine of Chester," by J. B. Yates, Esq., from the Editor. "On the Blasting of Rocks," by W. Nisbet, Esq., from the Author; May 14.—"Monthly Notices of the Royal Astronomical Society," Vol. XV., No. 6, from the Society; "Journal of the Geological Society of Dublin," Vol. VI., Part 2, from the Society; "Proceedings of the Yorkshire Philosophical Society," Vol. I., 1855, and "Annual Report for 1854," from the Society. May 28.—"On Trade and Partnership," by Swinton Boulton, Esq., from the Author; "Transactions of the Ashmolean Society," Vols. I. and II., and Part of Vol. III., from the Society; "History and Description of the Barberini or Portland Vase," by James Boardman, Esq., from the Author.

Many objects of interest, specimens of natural history, and rare works, have been exhibited at the meetings; and your Council trust that members will continue to afford gratification by such exhibitions. Your Council would recommend, at the same time, that previous notice be given to your Secretary.

That the various objects of this Society might in the public business receive due regard, sectional committees were appointed at an early period of the session. These were—

- A.—"Literature and the Fine Arts," J.B. Yates, Esq., chairman.
- B.—"Natural Philosophy and Science," S. Boulton, Esq., chairman.
- C.—"Natural History, including Geology and Ethnology," the Rev. H. H. Higgins, M.A., chairman.

Although the labours of these committees have been rendered light by the arrangements made by your Secretary, the Council recommend their continuance. And this leads your Council to observe, that the success of a session and facility of working mainly depends upon the united exertions of the members, on whom it is incumbent, even at personal sacrifice of time and trouble, to lay communications before the meetings. The individual exertions of others, in inducing their friends to join us, would aid this success, both intellectually and materially.

Your Council regard with interest the operation of the Liverpool Compass Committee, originally suggested by the British Association, and started by this Society; and they look forward with expectation to the practical results of their scientific inquiries.

The Treasurer's accounts will be laid before you, from which you will find that the expenses of management have been regulated by due regard to economy.



The Society is aware that, prior to the printing of the "Proceedings," there was a considerable surplus capital; but by the issue of these volumes, together with several grants made by the Society, amounting to £118, the funds have been reduced to the income arising from subscriptions. The table appended shows this.

INCOME AND EXPENDITURE DURING THE YEARS 1846 TO 1855, INCLUSIVE.																
INCOME.																
Annual Meeting.	Members' Subscriptions and Entrance Fees.			Interests.			From Sale of Pamphlets and Proceedings.			Total.	Remarks.					
Year.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.				
1846	64	1	0	5	16	8	1	1	0	70	18	8	In November, 1846, the Cash in the hands of the Treasurer was £350 19s. 11d. — The Subscription was raised temporarily to One Guinea in 1854.			
1847	75	1	6	7	7	9	3	2	8	85	11	11				
1848	70	7	0	6	8	9	0	4	6	77	0	3				
1849	72	9	0	3	6	6	0	8	0	76	3	6				
1850	69	16	6	2	8	4	1	10	6	73	15	4				
1851	72	19	6	3	4	4	1	4	4	77	8	2				
1852	68	15	6	3	13	6	0	18	6	73	7	6				
1853	72	9	0	3	17	8	0	7	0	76	13	8				
1854	145	19	0	3	5	5				149	4	5				
1855	88	4	6				4	16	6	93	1	0				
EXPENDITURE.																
Annual Meeting.	Ordinary Management of the Society.			"Proceedings."			Special Grants.			Total.	Balance in favour of the Society.					
Year.	£	s.	d.	Vol.	£	s.	d.	a. to Roy. Instn.	b. to Brit. Assocn.	£	s.	d.	£	s.	d.	
1846	32	3	3	1	52	19	0	—	—	85	2	3	245	16	4	
1847	40	4	7	2, 3	67	2	0	a	21 0 0	128	6	7	203	1	8	
1848	39	5	2	4	56	13	0	a	21 0 0	116	18	2	163	3	4	
1849	51	10	6	5	55	9	0	a	21 0 0	127	19	6	111	7	4	
1850	38	12	4	—	—	—	—	—	—	38	12	4	146	10	4	
1851	33	18	8	6	122	9	6	—	—	156	8	2	67	10	4	
1852	46	19	1	—	—	—	—	—	—	46	19	1	90	18	9	
1853	29	12	9	—	—	—	—	—	—	29	12	9	137	19	8	
1854	52	15	10	7	104	17	0	b	50 0 0	207	12	10	79	11	3	
1855	53	14	4½	8	100	16	1	—	—	154	4	5½	18 7 9½			
													and arrears	14	3	6

To continue the publication of your Society's proceedings on a scale of fulness, adequate resources must be placed at the command of your Council, who would regret to see the printing suspended or curtailed; and they cannot recommend a reduction of the ordinary expenses of management.

The average income of the Society, at half-guinea subscriptions, may

be estimated at £70, and the working expenses at £40; thus leaving but £30 for publishing the "Proceedings," the average cost of which has much exceeded that sum—the expense of the first eight volumes amounting in the aggregate to £560 5s. 7d.

The subject of life-membership having been brought under the notice of your Council, in connexion with an increased subscription, they would recommend that an alteration in the laws be made, so that the present and future members may compound for all subsequent subscriptions. A motion on this subject will be submitted to you.

Your Council are glad to report that, in accordance with their recommendation of the 4th of October, 1852, subsequently confirmed by the Society, admissions to all the public meetings are given to the presidents and secretaries, *ex officio*, of the Royal Institution, Polytechnic Society, Architectural Society, Chymists' Association, Photographic Society, Historic Society of Lancashire and Cheshire, and the Academy of Arts; and that this privilege is reciprocated.

The members of these societies were invited to the first of those important meetings when the Rev. Dr. Scoresby addressed the Society on the Compasses of Iron Ships; and on those other occasions when that subject engaged the Society's attention, the Polytechnic Society and the Compass Committee were admitted to the meetings; and this Society was invited to the public meeting of the Polytechnic Society when the same subject was brought before them. Your Council refer to these and other indications of good feeling with satisfaction, seeing that mutual intercourse not only strengthens hands but awakes dormant energy.

Finally, in accordance with the laws, the Council recommend for election upon the new Council the five following gentlemen: Francis Archer, M.R.C.S.E., Frederick W. Bloxam, Edward Bretherton, F.G.S., Rev. A. Ramsay, M.A., and Alfred Higginson, M.R.C.S.E.

They resign their trust, confident that the honour of this Society safely rests with its members, and that the Council to be chosen will carry out the intentions of the Society with zeal, prudence, and firmness of purpose.

Signed,

JOSEPH DICKINSON, M.D., F.R.S., President.  
DAVID P. THOMSON, M.D., Hon. Secretary.

**CR.**

1854.		£ s. d.	
Dec. 6.—To paid Mr. Rundell, Engraving .....		2	7 6
1855.			
Jan. 8.— " Mrs. Johnson, for Tea, Attendance, Candles, &c., and Gratuity to Turner .....	7 14 2		
June 5.— " Mrs. Johnson ditto .....	7 8 0	15	2 2
Feb. 6.— " "Mercury" Advertising Meeting .....	0 3 0		
Mar. 6.— " Mr. Baines, for Printing .....	4 9 0		
July 30.— " Ditto, ditto .....	3 10 0	7	19 0
May 16.— " Mr. Greenwood, for Printing .....	101 9 8		
June 9.— " Messrs. Ford & West, for Lithographing .....	3 9 2		
July 30.— " Mr. Greenwood, for Stationery .....	0 12 6		
Sep. — " Sundries and Stationery .....	0 18 0½		
" Turner, on account of late Secretary .....	0 13 0		
" Ditto, Commission on Collecting .....	2 15 0		
" Subscriptions .....	3 0 0		
" Clerical Assistance .....	8 0 0		
" Secretary's Accounts — Delivery of Circulars, Postages of Letters, Parcels, and two Issues of Proceedings .....	15 15 5		
To Balance carried down .....	£154 4 5½		
	32 11 3½		
	£186 15 9		
October 13th, 1855, Errors excepted. (Signed,) ISAAC BIRBLEY, Treasurer.			
Audited and found correct, ROBERT M'ANDREW.			
	JOSEPH B. YATER.		

1854.		£ s. d.	
Oct. 30.—By Balance from last Account .....		79	11 3
1855.			
Oct. 13.— " Sale of Proceedings .....	4 16 6		
" Subscriptions and Entrance Fees .....	88 4 6		
" Arrears due to the Society .....	14 3 6		
Balance brought down :—			
In hands of Treasurer .....	£18 7 9½		
Arrears due to Society .....	14 3 6		
	£32 11 3½		

# MEETINGS HELD AT THE ROYAL INSTITUTION,

On the 29th October, 1855,

WILLIAM IHNE, PH.D., VICE-PRESIDENT, in the Chair.

EXTRAORDINARY MEETING.—The resolutions which had been carried at the last ordinary meeting were again put to the vote and confirmed.

ORDINARY MEETING.—Mr. Daniel Mackinlay was elected an Ordinary Member.

Dr. IHNE exhibited a curious cinerary urn, found at Rome, remarkable especially for its inscription, which was by no means in good latinity. Mr. Foard offered to photograph the urn, and received the thanks of the Society. Dr. Ihne also exhibited some rare and curious coins, displaying Plotemy with a beard, and representing him as Jupiter Ammon.

The Rev. H. H. HIGGINS exhibited portions of the collection of local insects which is being formed in the museum of the Royal Institution.

Dr. EDWARDS exhibited two fish globes containing marine animals and seaweed, which were in a healthy condition, although the water had not been changed for upwards of fourteen months. Individuals had died and been replaced, but others had remained alive and multiplied. Fresh water had been occasionally added to supply the loss by evaporation.

The paper for the evening was—

## ON THE USEFUL PRODUCTS OF THE PALMACEÆ.

By T. C. ARCHER, ESQ.

THE Natural Order Palmaceæ comprises some of the most beautiful plants in the world, and is not only remarkable for the majestic forms of its species, and their position at the head of the Endogenous division of the vegetable kingdom, but also for the great value of their products to the human family. It is this last quality, and not the botanical history of the order, which will form the subject of the present paper. I will, however, arrange them as nearly as possible according to the system proposed by the late Mr. Wm. Griffiths in his magnificent work on the Palms of British India. I would rather have followed

that of Dr. Martius, but I have not access to his noble work, and it is to be regretted that in this large town, notwithstanding its boasted Public Library, works of this character are almost unknown.

## DIVISION I.—CALAMINÆ.

### SECTION FIRST.—PINNATED-LEAVED.

This division comprises several most useful genera. The first is *ZALACCA* an Indian genus, which yields the beautiful sticks called *Malacca canes*; these are the thin stems of *Z. edulis*, which, when first gathered, are of a bright yellow colour; in order to produce the much admired brown tint and mottled appearance, they are suspended by the natives over green wood fires until the smoke sufficiently changes their colour. A change of taste has however lately taken place, and the natural coloured canes are now most highly prized. The fruit of *Z. macrostachya* is eaten, and the petioles of the leaves used for fastening palmetto thatch.

*CALAMUS* is another Indian genus, several species of which yield useful products. The most valuable is the long slender stem of *C. rotang* (Linnaeus), or the Rattan cane of commerce, so extensively used in this country for chair bottoms, and a variety of similar purposes. It is applied to an amazing number of useful purposes in India and China. Not the least important is that of tying up various packages, such as tea-chests, &c., for transport to different countries: such bandages have an advantage which none of the ordinary fibrous materials possess; they are almost imperishable, and consequently are not rotted by exposure to damp in the vessel's hold; this arises from the large quantity of silex which these plants secrete and deposit on the outside of their stems.

Dragon's Blood is another product of this genus, and is yielded by *Calamus draco* (Willd.) and perhaps other species; it is a peculiar resinous secretion of the fruit, of a blood red colour, consisting of *Draconin*, a peculiar red resin, 90·7, fixed oil 2·0, benzoic acid 3·0, oxalate of lime 1·6, phosphate of lime 3·7. Its chief use is as a colouring matter for varnishes, and for dyeing horn in imitation of tortoise shell. Its pharmaceutical value is quite exploded.

The seeds of *Calamus erectus* (Roxb.) are used by the poor natives of India as a substitute for the areca nut, under the name of *Sun-gotta*.

Many palms of this division yield the valuable starch known as *sago*, from the Malay name *sagu*. It is produced by some of the species of *Calamosagus*, but more especially by the species of *Sagus* (Goertner), as *S. levis* (Runiph.) and *S. genuina* (Runiph.) This farina is prepared from the trunks of these palms, which are of a gigantic stature. The exterior of the stem consists of a hard thin shell of woody tissue.

but the interior is filled with pith or *medulla*, the cells of which are so full of the starch that it is stated on the authority of Crawford and Blume, as much as from 500 to 800 lbs. are sometimes yielded by one tree. For making the sago the tree must be cut before fructification commences.

The hairs of the petioles of *S. filaris* are used by the Malays for sewing.

*RAPHIA* is a genus of magnificent South American palms, luxuriating in the rich plains of the Amazon. One species *R. Tedigera*, (Martius,) is a glorious object—the enormous plume of pinnate leaves rising gracefully as feathers from the top of its cylindrical stem, is often from 60 to 70 feet in height. It is a great blessing to the natives, who make from the hard outer portion of the petioles, baskets, window blinds, &c.; from the softer internal portion they make shutters, doors, boxes, and almost every other domestic article which, in other countries, would be made of harder woods. The entomologists who explore its habitat are glad to get the pith for their insect boxes, in which it takes the place of cork.

*PLECTOCOMIA elongata* yields materials from its stems and petioles for making baskets and wicker work: this genus is East Indian.

*EUGEISSONA* is another Indian genus. Very common in Penang, the species *E. triste*, called by the Malays *Bertam* yields abundant materials for mats and thatch.

#### SECTION SECOND.—FAN-LEAVED.

*MAURITIA* (Linnæus).—An American genus, contains several useful species.

*M. FLEXUOSA* (Linnæus).—One of the finest of the Amazonian palms, is of immense importance to the natives, who make, from the exterior of the petioles, window blinds, baskets, &c.; and from the epidermis of the partially expanded young leaves, a beautiful thread with which they make their cordage and their hammock-cloths, especially the netted hammock or “rede,” which is often brought to Liverpool, as a curiosity. The fruit is scaly; but below the hard scales is a soft pulp, which the Indians scrape off and ferment in water, making a very favourite acid drink.

*M. CARANA* (Wallace).—Remarkable for its very beautiful fruit; produces an inferior kind of piassava, whilst the hard portions of the petioles are abundantly used for basket-work, lattice-work, &c., and the leaves are much prized for thatching: this, in a country where thatch is so universally used, is of great importance. It is stated that a roof thatched with Caranna will last for eight or ten years. From the wounded spadix of *M. vinifera*, is made a kind of palm wine or toddy.

## DIVISION II.—CORYPHINÆ.

This division, typified by the genus *CORYPHA* (Linnæus), yields numerous valuable materials: thus *C. gebanga* (Bl.), yields a leaf peculiarly useful for basket and mat-making, and, according to Dr. Lindley, produces employment for thousands of boys and girls in Java.

The leaves of the *Talipot Palm* of the East Indies constitute the Palmetto thatch of that country; they are of enormous dimensions, and the smaller ones are made into umbrellas, fans, &c. The *Coryphina* also yield sago from the pith of their stems. *C. cerifera*, the Brazilian Palm, called *Carnahuba*, yields wax from its leaves, which is often imported as Vegetable Wax.

*LIVISTONIA* (R. Br.)—A beautiful Indian genus of fan-leaved palms; has one very useful species, the *Toko-pat* of the Assamese. It is the *L. Jenkinsia*, (Griff.); its leaves are used for making the hat-umbrellas; for covering palanquins, and the roofs of boats, &c.: they are remarkably light, tough, and durable.

The next genus is *CHAMEROPS*, the only genus which extends so far north as Europe and North America; in the former continent it is represented by *C. humilis*, which grows in the extreme south of Europe, and in the latter by *C. palmetto*, which is found in lat. 34° 36°. An Afghanistan species, *C. ritchiana*, called by the natives *Muzurry*, yields a fibre which is extensively used for making cordage, &c.

*LICUALA* is an Indian genus. The species *L. pelluta* is called in the vernacular *chattah pat*; its leaves are in great demand amongst the lower orders for making hats. The well known walking sticks called *Penang Lawyers* are the slender stems of *L. acutifida*.

The next genus *PHŒNIX*, is one of the most useful of the order. *P. dactylifera* is the well known date bearing palm, the fruit of which is the chief food of many tribes of Asia and Africa; it has been cultivated from a very early period, and rewards the careful cultivator with improved varieties. In a letter addressed to Lord Palmerston, by Dr. James Richardson, on the dates of Fezzan, he states that nineteenth-twentieths of the population of Fezzan live on dates during nine months of the year. He also enumerates and describes 46 different varieties, the result of cultivation.

*P. sylvestris* is tapped for its juice, which is either fermented into palm wine or toddy, or else it is boiled for its sugar; of the latter article immense quantities are not only used in India, but also exported to Europe. It is rather less in value than cane sugar.

The small trunks of *P. paladosa* are used for walking sticks, which the natives believe to have a "charm" for driving away venomous serpents; the larger stems are much used for rafters of houses.

*P. farinifera* yields sago from its stem ; probably also this and other species furnish date sugar and palm toddy.

### DIVISION III.—ARECINÆ.

The genus *ARECA* belongs to India, and is there of great importance, owing to the extraordinary use of *A. catechu* in almost all parts of India. A piece of the nut with a little quick lime is wrapped in a piece of the leaf of the Betel peper, and chewed in the same way as other nations use tobacco ; its properties are very similar, it is narcotic, and excites the salivary glands.

The tribes of the Nagas and Abors use the seeds of *A. nagensis* instead of the Betel nut. They call it tal-pat.

There is one kind of Betel nut which is only used medicinally ; it is the fruit of *A. cocöides*. The seeds of *A. Dicksoni* are used by the poorer natives of Bedanore as a cheap substitute for the true Betel nut.

The native builders use the stems of *A. tigilaria* extensively for house posts.

The South American genera *LEOPOLDINA* (N. Sp.) *PIACABA* (Wallace), according to him yields Piacaba, and the natives use the hollowed stems of *Irartea setigera* for their gravestones.

*CARYOTA URENS*, according to Roxburgh, yields from its juice an immense quantity of palm wine or toddy, and its stem an abundance of sago.

*AREGNA* (Labillardiere) is an important genus.

*A. saccharifera* is one of the most valuable palms of India, its fibrous *rete* yields a material for making ropes, which are remarkable for their resistance to the action of wet. The juice is either drunk as toddy or boiled into sugar, of which it yields large quantities. The young albumen of the fruit is preserved in sugar as a sweetmeat, and the stems, which become hollow after the ripening of the fruit, are in great request for troughs, water pipes, &c. ; the stem also yields an abundance of sago.

### DIVISION IV.—NIPINÆ.

I am not aware of any economic value in the species belonging to this division, but many genera of the next are especially valuable.

### DIVISION V.—COCOINÆ.

*COCOS NUCIFERA*, the Cocoa Nut Palm, is an object of interest even to the inhabitants of Europe, as well as of the tropics, and little as we may think of this palm, it would be a great national evil if its products should be at this time abstracted from the commerce of Great Britain ;



it yields us a valuable vegetable fat, the importance of which is daily increasing in the manufacture of candles and soaps. For its use in the former manufacture we are chiefly indebted to the spirited manager of Price's Patent Candle Company, Mr. G. F. Wilson, from whom I have received the valuable series of cocoa nut oil and palm oil products exhibited. The credit of inventing the various methods of separating the neutral fats (stearine), and the acid fats (stearic acid), does not, it is true, belong to this celebrated Company, but I believe it is owing to the untiring energy and perseverance of Mr. Wilson that this valuable branch of manufacture has been brought to such perfection, and that the Company, whilst cheapening this elegant manufacture, receive the reward of public spirit and intellectual enterprise, by an annual distribution of profits ranging from forty to fifty thousand pounds. This Company, the largest of the kind in the world, is working an enormous amount of good for the Island of Ceylon, where they have large plantations of the cocoa nut palm.

The produce of each palm is enormous. An acre of cocoa plantation will yield about 4000 nuts per annum if well cultivated; if intended for oil, the kernels are extracted and are ground into a pasty mass called *coperah*; this is submitted to the necessary pressure in the oil mills, and yields for every 100 nuts 20 lbs. of the cocoa fat or oil, or 800 lbs. per acre; the *marc* or oil cake called *poonac*, is very valuable as food for cattle, and especially for manure; besides this, one of the most valuable of our fibrous materials is derived from the husk of the nut, so that the most troublesome part of the process for procuring the kernel, more than pays its expenses. This fibrous substance called *coir*, or in India *kyar*, is now of the utmost importance, as it forms one of the best materials for ropes like hawsers, which are constantly exposed to wet and require great strength, and for matting of various kinds. It is also manufactured into mats and brushes, serving as an excellent substitute for bristles. Such are the applications of the products of the cocoa palm in this country; but in order to estimate its real utility we must examine its uses to the natives of tropical countries where it flourishes near the sea shores in greater luxuriance than perhaps any other species of its most luxuriant tribe. Under the shade of a group of graceful cocoa nut palms the native chooses the spot for his habitation; this he constructs wholly of these palms, their fine stems furnishing him with the posts, rafters, and all the solid framework, the walls are made with thin pieces of the same, the window lattices are formed of strips of the large petioles, and the roof thatched with the leaves bound on with cordage made of the *coir*. For the furniture of the interior he is equally indebted to this remark-

able plant ; his chairs and tables are often made of the long and straight stems, which are hard and ornamental, being in fact the beautiful *porcupine* and *speckled* woods of our hard-wood merchants : the former is the name applied to the longitudinal sections of the stem, which have a beautiful striped appearance as if composed of small porcupine quills, the latter to transverse sections which are most curiously covered with dots formed by sections of the bundles of vascular tissue ; in this country both are used for inlaying. He also forms his drinking cups of the endocarp or hard shell of the nut, these will receive a high polish, and are made by the ingenuity of various tribes into many ornamental domestic implements and utensils, as spoons, ladles, cups, basins, &c. ; the kernel yields him an agreeable beverage, a pleasant food, and a valuable oil ; his cellar is stocked with wine made by fermenting the juice obtained by cutting the young spadix, and his most highly prized vegetable is the young shoot of central leaves called the palm cabbage.

This wonderful utility of the cocoa nut palm has caused it to be carried from its native country the East Indies to South America and the West Indies. It may be worth mentioning that many botanists have remarked upon the shape of this fruit, which seems admirably adapted for transmission by ocean currents—certainly its boat-like shape, having a keel and flat deck which ever way it falls, and its natural habitat the seaside, seem to favour this charming idea.

The other species of cocoas, seventeen in number, are all natives of South America, and are not remarkable for their utility.

Of the South American genus *BACTRIS* (Jacquin), only one species, the *Bactris maraja*, yields a useful product ; its fruits are eatable. This fruit which I now exhibit, is used as a food in two ways ; it has an agreeable subacid *mesocarp*, which is both eaten and made into a fermented drink, and the kernel has a pleasant cocoa-nut flavour.

*ACROCOMIA LASIOSPATHA* (Martius), the *Mucaja* of the Brazilian aborigines, has a fruit which, though oily and bitter, is much relished by the Indians.

*ASTROCARYUM* (Meyer), South America, has several useful species.

Mr. Wallace says that the cattle are very fond of the fruit of *Astrocaryum murumuru* (Martius), and will wander for days in the forest in search of it ; the kernels are nearly as hard as vegetable ivory and pass through their stomachs undigested ; of these hard kernels the pigs are equally fond, and on one estate where he had staid on the Amazon, they had scarcely anything to eat during a part of the year but those nuts which had passed through the stomachs of the cows.

*Astrocaryum vulgare* (Martius) is invaluable to the natives, as from the young and unexpanded leaves of the centre they make a fine strong fibre called Tucum, from which they manufacture their bow-strings, fishing lines, and nets, and in some places their hammock cloths.

*Astrocaryum tucuma* (Martius) yields a much prized fruit which is eaten by the Indians.

The hard oval seeds of *Astrocaryum jauari* (Martius), according to Mr. Wallace, are used by the Brazilian ladies of the upper Amazon as beads for their lace-bobbins, and the bark of the petioles of *Astrocaryum acaule* (Martius) is used for making baskets.

The next genus, *ATTALEA* (of Humbolt), is also a New World palm, and is of great importance to European commerce. From one species, *Attalea funifera* (Martius), certainly is obtained the common piassava of commerce, and the coquilla nut, so highly prized by turners for making a variety of small ornamental turnings.

Another species, *Attalea cahune* (Martius), produces the cahune nut of British Honduras, which has become a matter of some interest, in consequence of several importations having been received for experiment in the production of a valuable oil, which its kernels yield in great abundance; but I apprehend the difficulty of extracting the kernel from the very thick and hard shell will neutralise its value. The foliage of *Attalea speciosa* (Martius) and *Attalea spectabilis* is used for thatching, and the fruit of one or two species, especially *Attalea excelsa*, is burned for smoking the newly made India-rubber. It would be curious to investigate the action of this smoke upon caoutchouc, because, if mere wood smoke would do, the inhabitants would not be at the trouble of procuring the fruits of a very lofty palm for this purpose, and I have shewn by some observations which I communicated to the British Association, in 1854, that when ammonia is added to caoutchouc, light readily blackens and gives it solidity.

The magnificent genus *MAXIMILIANA* (Martius), one of the most majestic of Brazilian palms, has only three species, one of which, *Maximiliana regia*, yields an edible fruit, and its enormous boat-shaped spathes furnish useful cooking utensils to the hunters, cradles for the Indian infants, and baskets ready made.

*JUBÆA*, an American genus, the *MOLINGÆA*, of Berter, is very little known, but within the last three years several importations of the nuts of *Jubæa spectabilis* have taken place, and they have been offered for sale in our fruit shops under the name of *little coker nuts* (there are specimens on the table), but their qualities as edible fruit are of a very inferior character.

One of the curious examples of vegetable wax is yielded by a palm of this division—Humboldt's Wax Palm, which exudes large quantities of a whitish wax from the upper part of its stem—is the *Ceroxylon Andicola*.

DESMONCUS MACROACANTHUS is the palm from which the Brazilians make their curiously-ingenuous elastic mandioca squeezers, or "tipitis;" they are made from long strips of the outside of the stem.

The African genus ELAIS (Jacquin) closes the list of the division Coccinæ, and it is unsurpassed in value by any of the Palmacæ.

*Elais Guineensis* yields the valuable palm oil of commerce, one of the staple imports of Liverpool. The fruit is borne upon an immense thyrse-like spadix, each drupe is pear-shaped and somewhat less than a walnut, having a soft pulpy mesocarp of a bright orange colour, from which the oil is yielded abundantly when the fruit is exposed (after gathering in heaps) to the sun in the manner employed by the olive growers.

It is quite startling if we begin to think of the vast extent to which this tree must be yielded naturally or cultivated, for each tree does not yield more than ten pounds of oil at the utmost, and the quantity annually imported into England alone is now nearly thirty thousand tons, which would require six millions, seven hundred and twenty thousand trees; but it is probable that several crops are yielded in one year. We must on the other hand bear in mind that other countries are large importers as well as ourselves, and in Africa it is also largely used as food by the natives.

The hard albuminous kernels have also been found to yield an excellent oil, a limpid fluid when first expressed, but soon becoming a hard vegetable fat requiring a knife to cut it.

The palm oil yields by distillation with acid a valuable material called Palmitic Acid, (the stearic acid of this vegetable butter) and this mixed with the neutral fat (stearine) of the cocoa nut is found to form the best known composition for candles, and is, in fact, the material of Price and Co.'s candles, which have won a world-wide celebrity. (The series exhibited shows every result of the manufacture.) Palm oil is not only used for candles, but is quite as extensively used in the manufacture of soap; it also constitutes a large portion of the grease composition used for the axles of railway carriages.

#### DIVISION VI.—BORASSINÆ.

Two Brazilian genera belonging to this division, GEONOMA (Willd.) and MANICARIA (Gærtner), contain species the leaves of which are much used for thatching, and the larger spathes of *Manicaria saccifera* are used for a variety of purposes, as caps, wrappers, baskets, &c.

HYPHANE THEBAICA, the Doom Palm of Egypt, has an edible fruit called the gingerbread nut, largely consumed by the Egyptians.

It now only remains for me to describe one other product of the Palmaceæ, namely, the so-called "vegetable ivory." This curious substance is the hard albuminous kernel of a very large palm, with a short procumbent stem, found in the hot plains of the lower Andes, in New Grenada, and elsewhere; it is called PHYTELEPHAS MACROCARPA, and does not range under any of the preceding divisions. Its magnificent pinnated leaves are from thirty to forty feet in height, and it bears immense clusters of its curious fruit at their base. The fruit when immature yields a delicious liquid resembling a custard in richness and delicacy of flavour; when ripe it becomes exceedingly hard and like ivory, and it can be carved into a variety of ornamental objects.

I have now brought to your notice most of the really important applications of this great natural order, and although there are doubtless some which I have omitted, I trust I have produced sufficient to interest you in this branch of botanical science, and prepare the way for further communications.

### THIRD ORDINARY MEETING,

ROYAL INSTITUTION, 12th November, 1855,

The Rev. H. H. HIGGINS, M.A., in the Chair.

Resignations were received from Messrs. Puckle, Potts, Banister, Sansom, Hartnup, and Burke.

Richard Brooke, Esq., F.S.A., was elected an Ordinary Member.

Mr. T. C. Archer exhibited a curious Chinese Map, a small Shark taken in the neighbourhood, and several specimens of "Nature's Printing;" Mr. Morton, several rare fossils; Mr. Marratt, several Mosses, collected since his list of local Musci was published; Dr. J. S. Taylor, an Exhibition Medal struck in Paris; and the

Rev. H. H. Higgins, a Parchment Document purporting to be laws and original list of members of the Moss-lake fields Cricket Society, dated 1807.

The paper for the evening, of which the following is the substance, was then read :—

## POETRY, AND ITS APPLICATION TO COMMON LIFE.

BY THE REV. J. ROBBERDS, B.A.

It was formerly supposed that Poetry was quite remote from common life, and that it lay entirely in what was far-fetched and out of the way—the picturesque regions of mythology and supernaturalism, or the wild and strange adventures of travel and war. Poetry was often talked of, and perhaps sneered at, as simply equivalent to *fiction*, the arbitrary invention of things not actually existing. The proverbial phrase, “a poet’s license,” was often understood to mean that a poet is at liberty to represent things in a manner quite contrary to truth and fact. The whole region of Poetry has sometimes been regarded as altogether technical and artificial, extraneous to real life, and having no natural foundation in the human heart.

Since the time of Wordsworth it has been unnecessary to prove that this was an entire mistake. It is now acknowledged that all true poetry is founded on the simplicity of nature, and responded to by the universal heart of man. No doubt a great deal of poetry, so called, has been written and admired, which was not of this genuine and simple character. Poetry was originally the spontaneous outpouring of natural feeling, under the influence of strong and deep emotion or elevated sentiment. But when the composition of poetry became a professed art, poets were apt to copy the conceptions and images of those who had preceded them, instead of trusting to their own natural resources, and the impulses of native genius. Thus, in our *sacred* poetry, our religious hymns, images are often introduced which were natural only to the country, climate, history and manners of the ancient Jews in Palestine, and were strictly appropriate, intelligible, and beautiful in the devout strains of the Hebrew psalmist, or the glowing fervour of the Hebrew prophet, but which, to our English ears, and with our English habits, sound affected, unmeaning, or even ludicrous. It may be said, indeed, with respect to many of these, that our religious associations, and especially our English version of the Scriptures, ought to make us sufficiently familiar with the imagery of Scriptural poetry to enter into it, almost as if it were of native growth in our own soil. But again, much of our earlier English poetry is full of allusions to the imagery, and especially to the mythology, of the ancient Greeks. The numberless divinities of earth, sea, and sky, who, in

the poetical vocabulary of the Greeks, personated their various passions, conceptions, sciences and arts; the Olympic deities, the Fates, the Furies, the Muses, the Graces, the Dryads, Nymphs and Fauns, with whom their rich and fertile fancy delighted to people their lovely and romantic land, were natural and appropriate to them; but when borrowed and artificially introduced into the poetry of modern England, they became a learned and pedantic affectation. Yet from the age of Elizabeth downwards for a long time, English poets generally deemed it necessary to write as though their readers were practically familiar with the imagery and mythology of the ancient Greeks. When both writers and readers have had a learned and classical education, it is certainly possible that the images and conceptions thus acquired may become a second nature to them, so as to admit of much genuine poetry, that is, of the lively expression of much sterling emotion and inspired feeling. This might be the case even if the poems were written in the Greek or Latin language, and some English poets, Milton for example, have written Latin poems of considerable power and beauty. Milton is a signal example also of the possibility of combining, in English poetry, the freshness of original genius with a learned literary style, and a profusion of classical as well as Scriptural lore. But even in the magnificent poetry of Milton, those passages which come most closely home to the experience of common human life, are those in which the true poetical spirit is most powerfully evinced. The descriptions of Adam and Eve, their conversations, their joys, their sorrows, their guilt, and the poet's exquisite allusion to his own blindness when describing the creation of light, affect us more strongly than the grand conceptions of the angelic host and the infernal fiends; and for this good reason, that the former proceeded from a fountain of natural feeling in the poet's own heart. Only that which comes from the heart can deeply move the hearts of others. And for the same reason I believe the most genuine and thrilling poetry must always be expressed in our native language, or what we expressively call our mother-tongue. The language which we learn in childhood, in which our first wants are expressed, our first ideas come to us, our first feelings are uttered, will always have more power to move the imagination and the heart than any foreign language, however carefully learned in after life. Accordingly, those passages even in Milton in which the poetry moves us most strongly, are those in which the words are drawn from the "pure well of English undefiled;" and he pays a conscious and worthy tribute to the purely English poetry of his great predecessor, when he expresses his delight to hear—

" — sweetest Shakspeare, Fancy's child,  
Warble his native wood-notes wild."

It is said that Molière was in the habit of reading his comedies to an old woman who was his housekeeper, as she sat at her work by the chimney corner, and that he could foretel the success of his play at the theatre from the reception it met with at his fireside, for the audience always followed the old woman, and never failed to laugh in the same place. What Molière found to be true with regard to the perception of wit and humour, is equally true, I believe, with regard to genuine poetry. If expressed in intelligible language, it will be felt by the purest child of nature. In fact the spontaneous language of nature and childhood very often is poetical. The language of the uncivilised North American Indians is almost made up of most truly poetical imagery.

Let us try to form a distinct notion of what we mean by poetry. The word poetry, or poesy, (from the Greek *ποίησις*), properly means the art of *making* or *creating*, because it creates or re-embodies the impressions which the poet has imbibed into his own mind. This faculty of producing from such elements the impression of individual character, action or scenery, is the power which is termed Imagination. Poetry is that mode of conceiving and describing anything, which is natural to the imagination and the heart. True poetry is always prompted by some degree of emotion or sympathy. That part of poetry which consists in the mere conception of curious, ingenious or beautiful imagery, without any impulse of feeling, we call Fancy; but poetry does not deeply interest us, unless sustained by the warmth of Imagination, properly so called. Poetical ideas have been defined to be "natural, but not obvious," that is, recognised at once as just and beautiful when pointed out and expressed for us by the poet's superior sensibility and power of discernment. Hence the power of poetry often depends upon the imagination of the reader, the poet using expressions which excite the imagination without gratifying it, suggesting rather than depicting an image. Thus Milton, speaking of the Messiah going forth to expel from heaven the rebellious angels, says—

*"Far-off his coming shone,"*

Making the reader strive to imagine for himself the splendour of what is hinted in the indefinite phrase, "his coming." Again, in his celebrated description of Death, he says—

*"The other shape,*

*If shape it might be called that shape had none,  
Or substance might be called that shadow seemed,  
For each seem either."*

It is in this power of vague and undefinable expression, forcing the imagination of the reader to make an effort beyond what is actually described, that the art of poetry is superior to that of painting, which is generally compelled to portray everything with exact completeness.



The poet is not essentially different from common men ; he is only more a man than common men. He perceives more acutely, conceives more vividly, and feels more deeply. Common men have more or less of poetical feeling, so as to be able to enter into and sympathise with what the poet utters, though they have not enough to find it out and express it for themselves. "Poetry," says Shelley, "lifts the veil from the hidden beauty of the world, and makes familiar objects be as if they were not familiar." Coleridge has well said that "to carry on the feelings of childhood into the powers of manhood ; to combine the child's sense of wonder and novelty with the appearances, which every day for perhaps forty years had rendered familiar ; this is the character and privilege of genius, and one of the marks which distinguish genius from talents. \* \* \* Who has not a thousand times seen snow fall on water? Who has not watched it with a new feeling, from the time that he has read Burns's comparison of sensual pleasure

'To snow that falls upon a river,  
A moment white, then gone for ever!'

In like manner the everyday phenomena of the tides of the ocean acquire fresh interest from the comparison of Shakspeare:—

"There is a tide in the affairs of men,  
Which, taken at the flood, leads on to fortune ;  
Omitted, all the voyage of our life  
Is bound in shallows and in miseries."

How poetical is the comparison to a ship in the following passage from the Merchant of Venice!—

"All things that are,  
Are with more spirit chased than enjoyed.  
How like a younker, or a prodigal,  
The skarfed bark puts from her native bay,  
Hugg'd and embraced by the strumpet wind!  
How like a prodigal doth she return,  
With over-weather'd ribs and ragged sails,  
Lean, rent and beggar'd by the strumpet wind!"

"Poetry," says Leigh Hunt, "begins where matter of fact or of science ceases to be merely such, and to exhibit a further truth ; that is to say, the connexion it has with the world of emotion, and its power to produce imaginative pleasure. Inquiring of a gardener, for instance, what flower it is we see yonder, he answers, 'a lily.' This is matter of fact. The botanist pronounces it to be 'Hexandria Monogynia.' This is matter of science. It is the '*lady*' of the garden, says Spenser ; and here we begin to have a poetical sense of its fairness and grace. It is

'The plant and flower of light,'

says Ben Jonson ; and poetry then shows us the beauty of the flower in all its mystery and splendour."

The poetry consists in a beautiful, yet perfectly natural play of the imagination, which, in the first instance, expresses the delicate, graceful beauty of the flower by calling it a lady, and, in the second instance, expresses its purity and brilliance by identifying it with light. Again, few can be insensible to the deep stillness, the hushed and dream-like loveliness of a moonlight night in the country. An astronomer will perhaps see in the dim spectral light only a pale cold reflection of the fiercer glory of the sun ; but a poet like Shakspeare exclaims—

“ How sweet the moonlight *sleeps* upon this bank ! ”

He seizes the peculiar charm of the scene and puts it prominently forth by personifying the moonbeams as a living being, asleep upon the grassy bank, which they bathe in their gentle light. Let us take another example—a ship at sea, sailing before a gentle breeze. Common minds would have nothing to say of it beyond the fact of a vessel impelled by the wind over the surface of the water. A seaman would recognise all the technical characteristics, and tell us whether it was a ship, a barque, or a brig. But what says the poet?—

“ She walks the waters like a thing of life.”

The poet's imagination at once *personifies* the ship, expressing its beautiful appearance and graceful motion by speaking of it as a living being, gliding along with gentle ease and dignity. The simple pronoun “ she,” commonly applied to a ship, is strictly poetical in the same way ; and so, indeed, really are many of the expressions embodied in our common talk.

Let us take one or two more extended examples of what I mean by the *truth* of poetry, that is, its accordance with the natural feelings of the human heart. Shakspeare's “ King Lear,” exposed to the violence of a storm when driven from house and home by the cold ingratitude of the two daughters between whom he had divided his kingdom, thus defies the fury of the tempest —

“ Blow, winds, and crack your cheeks ! rage ! blow !

\* \* \* \* Spit, fire ! spout, rain !

Nor rain, wind, thunder, fire, are my daughters :

I tax not you, ye elements, with unkindness ;

I never gave you kingdoms, call'd you children ;

You owe me no subscription ; why then let fall

Your horrible pleasure ; here I stand, your slave,

A poor, infirm, weak, and despised old man :—

But yet I call you servile ministers,

That have with two pernicious daughters join'd

Your high engender'd battles, 'gainst a head

So old and white as this. O ! O ! 'tis foul ! ”

The poetical truth of this passage consists in its power of exciting our own involuntary sympathy with the thoughts and words of the aged

and injured king. What is more true to the human heart than to associate the aspect of external nature with our own situation, and to feel as if it ought to sympathise with our own joy or grief? How sweetly and touchingly is this truth embodied in Burns's well-known lament of an unhappy maiden:—

“Ye banks and braes o’ bonnie Doon,  
How can ye bloom sae fresh and fair?  
How can ye chant, ye little birds,  
And I sae weary, fu’ o’ care!”

The ever-memorable Wordsworth has done distinguished service to the cause of true poetry, by showing that it may be, and ought to be, expressed in simple language, and freed from the affectation and conventional rules by which it has been so greatly disfigured and obscured. Perhaps he pushed his theory to an erroneous extreme, in some of his poems, mistaking what is *trivial* for the proper simplicity of genuine poetry. The poet always aims at the expression of beauty. On every subject he seizes hold of the essential truth as it appears to his own heart, discarding all that is incongruous or irrelevant, and naturally endeavouring to clothe his conceptions in appropriate beauty of phrase: hence it is that the effect of poetry is more complete when not merely the ideas are poetical, but they are conveyed to us in verse. It is sometimes said, and with truth, to be the test of good poetry, to express the thoughts in prose, and see if they then strike us as poetical. But we must not expect that *all* their poetical power will be preserved when stripped of the beauty of verse. There is a pleasure to the ear in a musical measure, and in the regular recurrence of rhyme, and it is a pleasing surprise to the mind to find the thoughts of the poet flowing with just and pure expression in easy and graceful accordance with the measure and the rhyme. Even in prose the effect of good thoughts is greatly enhanced if they are expressed in a good style, and verse is only a systematic development of the beauty of style. It is the natural impulse of the poet to study true beauty of effect in everything that can heighten and make more complete the expression of his thoughts. Accordingly, in poetry intended to be set to music, we do not appreciate its full power until we have heard it sung. No one can have heard the songs of Burns or of Moore, for example, well sung to the sweet national airs for which they were composed, without feeling that something is wanting to their full effect when they are merely read. Poetry and music are closely associated. The most ancient poetry (such as the Psalms of David and the rhapsodies of Homer), was composed and sung by bards, whence one of the affectations of modern poets has been to express themselves as *singing* their various themes, even when the poetry

was not of a kind adapted for music. The genuine poet will always aim to be true to Nature ; but then he will wish to represent Nature's truths in their most beautiful aspects, just as the painter tries to catch and preserve what Coleridge calls " the sudden charm, which accidents of light and shade, moonlight or sun-set, diffuse over a familiar landscape." Nay, as Wordsworth expresses it, true poetry does to all thoughts and to all objects

" Add the gleam,  
The light that never was on sea or land,  
The consecration, and the poet's dream."

The musical beauty of language, the measure and the rhyme which the poet adopts, tends to keep in view the proper essence of his ideal object.

Poetry may be of various kinds. There is descriptive poetry, or the poetry which describes whatever is grand or beautiful in external nature, as seen by a poet's eye, enlivened by his fancy and interpreted by his imaginative and sympathising heart. This occurs incidentally in the works of many poets, but abounds most, of course, in those of the closest and most loving observers of nature, such as Scott and Wordsworth. There is the poetry which deals in pure creations of fancy, supernatural beings, such as fairies, ghosts, or allegorical monsters, preserving however a certain truth to nature sufficient to enable us to be carried away by the genius of the poet, and to sympathise with the characters as real beings. Most exquisite poetry of this kind is to be found in Spenser, Shakspeare, Coleridge, Keats, and Shelly. There is the poetry, sometimes sportive, but oftener grave and often sad, which describes human beings, their characters, lives, actions, experience, affections, joys, and sorrows. This includes, of course, the noble dramatic poetry of Shakspeare, the sweet and truthful songs of Burns, and the pure and thoughtful poems of Cowper and Wordsworth. Then there is sacred poetry, or that which deals with the solemn subjects of man's religious faith and hope, his sense of duty—his liability to guilty shame—his awful relation to God and Heaven. This includes Milton, Young, and the writers of all our best hymns and devotional pieces, Watts, Wesley, Doddridge, Heber, Keble, and many others. It is obvious that poetry, by its very nature, is eminently fitted to adorn and illustrate the great truths of religion, which in turn, are the noblest subjects to which its powers can be applied. In short, as Leigh Hunt says, " the means of poetry are whatever the universe contains, and its ends pleasure and exaltation."

The different and even opposite definitions which have been given of Poetry, may, I think, by a little consideration, be reconciled with each other as partial and one-sided views. Aristotle calls the art of poetry

imitative or truthful, and the pleasure afforded by it the pleasure attendant on the perception of a truth. Bacon, on the other hand, calls the poetic art creative or feigned, and the pleasure afforded by it the pleasure of deception. Plato speaks of it at one time as creative, at another as imitative. The complete truth I believe to be, as the Germans would express it, that Poetry is true and imitative *subjectively*, but creative or fictitious *objectively*; that is, it truly represents the impressions and emotions of our own minds, though by the aid of fanciful and fictitious forms; and gives us pleasure by awakening our deepest sympathy, and at the same time surprising us with a beautiful but unexpected congruity or analogy. Though the form be perceived to be fictitious, yet our feelings acknowledge that it is an appropriate and well-invented fiction. Thus when Æschylus speaks of

πόντιων τε κύματων

ἀνήριθμον γέλασμα,

"the measureless *laughter* of the ocean's waves," we are pleased with the beauty and appropriateness of the metaphor, as descriptive of the interminable sparkling and dashing of a sunny sea, though of course we know that except in reference to the impression on our own minds, the metaphor is purely fictitious. So when Tennyson says (in his "Lotos Eaters")

"The *charmed* sunset lingered low adown

In the red west,"

it is truthful in regard to our own feelings to interpret the slow and gradual fading of the sun's light, as though he were an animated being, reluctant to take his departure from a scene so fair, though in any other relation we know it to be false; and it is this congruity of the fiction with our natural feelings which gives us pleasure. Where the feelings do not readily respond, the analogy seized hold of becomes a fanciful conceit, approximating to wit rather than to poetry, as in Lord Chesterfield's simile—

"The dews of the evening most carefully shun—

They 're the tears of the sky for the loss of the sun;"

on which Wordsworth has observed that there is not an adequate occasion for the imagined sorrow of nature, and he contrasts it with Milton's description of the effect on nature of the fall of Adam:

"Sky lour'd, and, mutt'ring thunder, some sad drops

Wept, at completing of the mortal sin."

Shakspeare has many quaint poetical conceits, as, for instance, in his reference to the chalk cliffs on both sides of the channel, in "Henry V. (Act V. Scene 2)—

———"that the contending kingdoms

Of France and England, whose very shores *look pale*

*With envy* of each other's happiness,

May cease their hatred."

Byron, again, very beautifully, but perhaps too ingeniously for purely poetical effect, describes Bianca (in the "Giaour") as having

"A foot of snow, that falls to earth as mute."

In such instances we are more struck with the ingenuity of the idea than with the truth of the feeling expressed, and experience rather the surprise afforded by wit, than the sense of beauty or grandeur which true poetry always conveys. Such instances, however, illustrate the analogy which exists, to a certain extent, between poetry and wit, the effect of each being to surprise us by an unexpected congruity, but the one by its appeal to our sympathising emotions, the other by its amusing oddity.

The child's fancy, that the whispered sound of the shell held to the ear is the retained roar of its native sea, is full of poetry, and poets have not failed to make beautiful use of it. Thus Landor, in his "Gebir":—

"But I have sinuous shells of pearly hue  
Within; and they that lustre have imbibed  
In the sun's palace-porch, where, when unyoked,  
His chariot wheel stands midway in the wave.  
Shake one, and it awakens; then apply  
Its polished lips to your attentive ear,  
And it remembers its august abodes,  
And murmurs as the ocean murmurs there."

Wordsworth also, in his "Excursion," Book IV.—

"I have seen  
A curious child, who dwelt upon a tract  
Of inland ground, applying to his ear  
The convolutions of a smooth-lipped shell;  
To which, in silence hushed, his very soul  
Listened intensely; and his countenance soon  
Brightened with joy; for murmurings from within  
Were heard, sonorous cadences! whereby,  
To his belief, the monitor expressed  
Mysterious union with his native sea.  
Even such a shell the universe itself  
Is to the ear of faith; and there are times,  
I doubt not, when to you it doth impart  
Authentic tidings of invisible things;  
Of ebb and flow, and ever-during power;  
And central peace, subsisting at the heart  
Of endless agitation."

It is not improbable that, in like manner, much of the poetry of the ancient Greeks and Hebrews originated in positive belief of the objective reality of ideas which were afterwards recognised only by the imagination and heart of the poet. Much of the bold and sublime

Hebrew imagery may have thus originated in the mind of a primitive and devout observer of nature ; as, for example, in the 104th Psalm :—

“ He covereth Himself with light as with a garment ;  
 He spreadeth out the heavens like a curtain ;  
 He layeth the beams of His chambers in the waters ;  
 He maketh the clouds His chariot ;  
 He rideth on the wings of the wind ;  
 He maketh the winds His messengers ;  
 The flaming lightnings His ministers.”  
 “ He looketh on the earth, and it trembleth ;  
 He toucheth the hills, and they smoke.”

Of the Greek mythology Coleridge has beautifully said, in his translation of Schiller's “ Piccolomini :”—

“ Fable is Love's world, his home, his birth-place ;  
 Delightedly dwells he 'mong fays, and talismans,  
 And spirits ; and delightedly believes  
 Divinities, being himself divine.  
 The intelligible forms of ancient poets,  
 The fair humanities of old religion,  
 The power, the beauty, and the majesty,  
 That had her haunts in dell, or piny mountain,  
 Or forest by slow stream, or pebbly springs,  
 Or chasms and wat'ry depths ; all these have vanish'd :  
 They live no longer in the faith of reason ;  
 But still the heart doth need a language ; still  
 Doth the old instinct bring back the old names,  
 And to yon starry world they now are gone,  
 Spirits or gods, that used to share this earth  
 With man as with their friend ; and to the lover  
 Yonder they move ; from yonder visible sky  
 Shoot influence down ; and even at this day  
 'Tis Jupiter who brings whate'er is great,  
 And Venus who brings everything that's fair.”

Shakspeare also illustrates the essential truth enshrined in the poetry of ancient Greece, as in the familiar passage on the power of music, in the “ Merchant of Venice :”—

“ For do but note a wild and wanton herd,  
 A race of youthful and unhandled colts,  
 Fetching mad bounds,—bellowing and neighing loud,  
 Which is the hot condition of their blood ;  
 If they but hear, perchance, a trumpet sound,  
 Or any air of music touch their ears,  
 You shall perceive them make a mutual stand—  
 Their savage eyes turned to a modest gaze  
 By the sweet power of music. Therefore the poet  
 Did feign that Orpheus drew trees, stones and floods,  
 Since nought so stockish, hard, and full of rage,  
 But music for the time doth change his nature.”

The same truth has been beautifully illustrated, in reference to the divinities with which Greek imagination peopled the sea, by Mr. Kingsley, in his "Glaucus."

It would be easy to multiply, to any extent, illustrations of the union of subjective truth with fictitious form, in which true poetry consists. I will content myself with quoting some striking lines on the Death of an Infant, by an American writer, Mrs. Sigourney :—

"Death found strange beauty on that cherub brow,  
And dash'd it out. There was a tint of rose  
On cheek and lip ; he touched the veins with ice,  
And the rose faded. Forth from those blue eyes  
There spake a wishful tenderness—a doubt  
Whether to grieve or sleep, which Innocence  
Alone can wear. With ruthless haste he bound  
The silken fringes of their curtaining lids  
For ever. There had been a murmuring sound,  
With which the babe would claim its mother's ear,  
Charming her even to tears. The spoiler set  
His seal of silence. But there beamed a smile,  
So fix'd and holy, from that marble brow,—  
Death gazed and left it there ; he dared not steal  
The signet-ring of heaven."

It will perhaps have appeared from what has already been said, in what manner poetry admits of being applied to common life. One way may often be by withdrawing our thoughts for a time from the cares and anxieties attendant on daily duty, to dwell in spirit with the beautiful creations of the poet. What Shakspeare says of man is eminently true of the poet, that "he looks before and after." Dr. Johnson also has remarked how much it adds to the dignity and elevation of man to be enabled to extend his gaze back into the past, and forward into the future, and abroad over the universe, and not to confine all his thoughts to the narrow limits of the present moment, and of the spot on which he stands. In the same way, then, it is an elevating occupation, as well as an innocent and delightful resource, to forget ourselves at times in the ideal regions of poetry. It may be to us, in the words of Shelley—

"like the bright procession  
Of skiey visions in a solemn dream,  
From which men wake as from a paradise,  
And draw fresh strength to tread the thorns of life."

But the peculiar application of poetry to common life which I had in view, is closer and more immediate than this. Poetry may add to the significance and pleasure of life, not merely by making us forget, at times, our own realities in its ideal pictures, but by teaching us to



look with something of a poet's spirit on the conditions of our actual existence, so as to find freshness and beauty in what we might otherwise deem dull and wearisome.

With regard to descriptive poetry, the poetry which deals with the beauties of external nature, it may perhaps be said that it is applicable to the common life of those only who live in the country, and habitually see nature in all her loveliness. But even those who live in a large town sometimes visit the beauties of the country, and relish them more intensely perhaps, from their rare and transient glimpse, than those who live in the midst of them, and who are too often insensible of their constant privilege. Wordsworth says,—

“To me the meanest flower that blows can give  
Thoughts that do often lie too deep for tears.”

And it has been truly said by another poet, that “a thing of beauty is a joy for ever.” What we have once seen we can retain with us by the blessed power of memory, and make it a refuge and companion amid less pleasing scenes. Thus Wordsworth says, in his beautiful poem on revisiting Tintern Abbey—I can here give only the beginning of the passage :—

“These beauteous forms,  
Through a long absence, have not been to me  
As is a landscape to a blind man's eye :  
But oft, in lonely rooms, and 'midst the din  
Of towns and cities, I have owed to them,  
In hours of weariness, sensations sweet,  
Felt in the blood, and felt along the heart ;  
And passing even into my purer mind,  
With tranquil restoration.”

There is a sonnet by Keats, on the Grasshopper and the Cricket, which pleasantly connects the fireside of the humblest home with the country in the glories of summer :—

“The poetry of earth is never dead :  
When all the birds are faint with the hot sun,  
And hide in cooling trees, a voice will run  
From hedge to hedge about the new-mown mead :  
That is the grasshopper's : he takes the lead  
In summer luxury ; he has never done  
With his delights ; for when tired out with fun,  
He rests at ease beneath some pleasant weed.  
The poetry of earth is ceasing never :  
On a lone winter evening, when the frost  
Has wrought a silence, from the stove there shrill-  
The cricket's song, in warmth increasing ever ;  
And seems, to one in drowsiness half lost,  
The grasshopper's among some grassy hills.”

But again, even in our large town itself, we are not without elements of poetry. We have our noble river, with the mysterious tides of the infinite ocean daily rushing into it; we can look across it to the green and smiling Cheshire shore, and the grander though more distant beauties of the mountains of Wales, diversified with gleam and shadow, and sometimes streaked with snow.

All poets agree that the sea, the boundless and ever-changing deep, is the most poetical object in nature, the most sublime source of poetical sentiment and emotion. It would be endless to quote all that poets have written upon this great neighbour of ours. Milton has taken one of his noblest images from the skiey and transparent expanse of the ocean when seen from a high cliff:

"As when far off at sea a fleet descried  
Hangs in the clouds \* \* \*  
\* \* \* \* so seemed  
Far off the flying Fiend."

Byron's magnificent address to the ocean in "Childe Harold" will here occur to the memory of every lover of poetry. Then we have the ever-varying beauties of "the sky which bends o'er all,"—the glories of sun-set, and the chaste purity of moon-light. Shelley's poem on "The Cloud," too long to be quoted, is full of the most brilliant and truly poetical fancy, and strictly appropriate to what all may observe. We can enter into the beauty of all the descriptive poetry which relates to night and to the moon; and there is much of this, for it is a favourite source of imagery and allusion with many poets. Southey, for example, in his "Thalaba," exclaims—

"How beautiful is night!  
A dewy freshness fills the silent air:  
No mist obscures, nor cloud, nor speck, nor stain,  
Breaks the serene of heaven:  
In full-orbed glory, yonder moon divine  
Rolls through the dark blue depths.  
Beneath her steady ray  
The desert-circle spreads,  
Like the round ocean, girdled with the sky,  
How beautiful is night!"

Even to the inhabitants of a large town there is truth in the sentiment of Mrs. Hemans—herself a native of Liverpool—

"There's beauty all around our paths, if but our tranquil eyes  
Would trace it in familiar things, and wrapt in lowly guise."

But if we are shut out from much of the beauty of nature, there are elements of poetry in some of the social features of our vast town. Cowper has indeed said—

"God made the country, and man made the town;"

But we must remember that God made man, and that man is his noblest work. The discoveries and inventions of the human mind are really the most wonderful developments of nature. Shakspeare has truly said, that

—"nature is made better by no mean,  
But nature made that mean. So ev'n that art,  
Which you say adds to nature, is an art  
That nature makes! \* \* \*  
\* \* \* The art itself is nature."—(*Winter's Tale.*)

Our ships, beautiful and picturesque objects often in themselves, which come and go across the mighty ocean, between this port and the most distant climes, laden with the various produce and manufactures of all lands; our railways, stretching to all parts of the country, the engines snorting like living monsters, and, with the speed of a bird, conveying hundreds of human beings on their various errands of business, joy or sorrow; the post-office, communicating cheaply and swiftly between us and our friends, however distant, so that we approximate to the divine attribute of omnipresence, "knowing their thoughts afar off;" the electric telegraph, which reduces space to nothing, and enables men to speak to one another at a distance of hundreds of miles as if they were close together;—all these, and many other arts which busy man has invented, abound in elements of true poetical interest, moving the imagination with mysterious wonder. Shakspeare makes a fairy messenger exclaim—

"I'll put a girdle round about the earth  
In forty minutes."

Should the electric telegraph be extended, as we cannot doubt that it ultimately will be, from continent to continent, this dream of the poet will be more than realised, for we should then actually be able to send a message round the earth in forty *seconds*! It is sometimes interesting to read descriptions of things and scenes that we are familiar with, as they appear to men of genius, who seize upon their characteristic features and present them again to us with freshness and yet with strict truth. I remember reading a description of England by Emerson, addressed to an American audience, which was very striking in this way. I seemed never to have fully realised the wonders and beauties of my own country before. Of this kind, too, was a description in "*Frazer's Magazine*," of the General Post Office in London, just before the time of despatching the mails. To the writer's fancy it seemed like a huge animal, devouring in its capacious maw the heaps of letters and newspapers, the process of sorting which was likened to the digestion of the food, preparatory to its circulation through the system.

Then again all poetry that appeals to human experience and affections—(and there is little true poetry that does not, more or less directly)—all genuine poetry that deals worthily with human joy and sorrow, life and death, childhood, youth, and age; love, friendship, home, with its cares and its delights; is intelligible and touching everywhere. Rogers has truly said of human life in general:—

“Yet is the tale, brief though it be, as strange,  
As full, methinks, of wild and wondrous change,  
As any that the wandering tribes require,  
Stretched in the desert round their evening fire;  
As any sung of old, in hall or bower,  
To minstrel harps at midnight’s witching hour.”

And James Montgomery has beautifully treated the same truth in his simple but expressive poem, “The Common Lot.” There is much that breathes the same spirit in the heart-stirring poetry of Robert Burns, who, as it has been truly said, “made rustic life and poverty grow beautiful beneath his touch.”

It would be easy to quote many passages of true poetry illustrating the grace, dignity and glory, of which human life admits, even under the humblest and homeliest guise. I must content myself, however, with a short poem by Caroline Bowles (now Southey’s widow), on a subject of solemn but universal interest, which will form a fitting conclusion to my extracts.

#### “THE PAUPER’S DEATHBED.”

“Tread softly—bow the head—  
In reverent silence bow—  
No passing bell doth toll—  
Yet an immortal soul  
Is passing now.

Stranger! however great,  
With lowly reverence bow;  
There’s one in that poor shed—  
One by that paltry bed—  
Greater than thou.

Beneath that beggar’s roof,  
Lo! death doth keep his state:  
Enter—no crowds attend—  
Enter—no guards defend  
This palace gate.

That pavement damp and cold  
No smiling courtiers tread;  
One silent woman stands,  
Lifting with meagre hands  
A dying head.

No mingling voices sound—  
An infant wail alone;  
A sob suppressed—again  
That short deep gasp, and then  
The parting groan.

Oh! change—oh! wondrous change—  
Burst are the prison bars—  
This moment there, so low,  
So agonised, and now  
Beyond the stars!

Oh! change—stupendous change!  
There lies the soulless clod:  
The sun eternal breaks—  
The new immortal wakes—  
Wakes with his God.”

To conclude, we may not be able, like Coleridge, to compose poetry: but we may so feel it in the writings of others, and in its reflection in our own hearts, as to be able to say with Coleridge, "Poetry has been to me its own exceeding great reward; it has soothed my afflictions; it has multiplied and refined my enjoyments; it has endeared solitude; and it has given me the habit of wishing to discover the good and the beautiful in all that meets and surrounds me."

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#### FOURTH ORDINARY MEETING,

ROYAL INSTITUTION, Nov. 26, 1855.

ROBERT M'ANDREW, Esq., F.R.S., PRESIDENT, in the Chair.

The resignation of Mr. G. M. Davis was received.

Mr. A. Böhtlingk was elected an Ordinary Member.

Mr. Foard presented copies of his photograph of the urn exhibited by Dr. Ihne, and received the Society's thanks. One of these was directed to be presented to Miss A. Hope, to whom the urn belongs. another to the President, and a third to Dr. Ihne.

Mr. Edward Fletcher exhibited a very handsome Fungus, *polyporus versicolor*; Mr. T. C. Archer, a specimen of the Shola stem; Mr. Marrat, the *Encalypta ciliata*, which he considered had been mistaken for the *E. streptocarpa*, a moss which he had not found in this place; and Dr. Ihne, several Roman coins, each possessing a peculiar interest. One was that of Nero, whose head was ornamented with a *corona radiata*, the symbol of divinity; another was of Claudius; and the third was of Julia Mamaea, the mother of Severus, whose face was singularly beautiful and expressive, and the head dress a diadem and wig.

The papers for the evening were—

ON MAGNETIC VARIATION, AND THE PROCEEDINGS OF THE LIVERPOOL COMPASS COMMITTEE, by W. W. Rundell, Esq.; and

## ON THE CULTIVATION OF MOSSES.

BY THE REV. H. H. HIGGINS, M.A.

THE cultivation of Mosses has probably very little to recommend it to notice if it be regarded only in a utilitarian aspect, none of our English species, so far as I am aware, being at all extensively used in this country, either in the arts, or in domestic economy, which may in some measure account for the little that is to be found written upon the subject. Here and there a warm admirer of Nature, even in her lowliest productions, has no doubt long ago found a delight in sheltering and watching a collection of these tiny plants—the author of the “*Bryologia Britannica*,” for example, who the other day sent the writer a specimen of a fork moss which had been domesticated for fifteen years: but until the comparatively recent invention of Wardian cases gave a happy impulse to this and many kindred adoptions, mosses were generally known only in their wild state, in the herbaria of the botanists, or as the unwelcome disfigurers of our gravel walks. Yet mosses have certainly many qualifications which give them an advantage over most other plants for cultivation, especially amongst the inhabitants of large towns. Some of these I shall now enumerate.

Their size requires but small space for the cultivation of a considerable number of species. An ordinary window case might well accommodate from fifty to a hundred kinds, allowing them to attain their full size and luxuriance. Whereas ferns or other plants, in a similar situation, must be restricted in their growth, or the number of species must be very limited.

Their tenacity of life ensures success with a very moderate degree of attention to their wants. In fact they are grateful little creatures, and reward the care bestowed upon them by readily putting on their best and freshest looks, as if they were mindful their protector in none of his walks should see any mosses looking better or prettier than his own.

Their neighbourly habits place them within the reach of the collector in an ordinary walk. Instead of applying to the florist, or incurring the expense of importing plants from distant regions, he has only to pass the boundaries of the streets in any direction, and he will find them all around him. The screw moss and the silver thread moss will not even need his stooping to secure them; they wait for him upon the wall, at the level of his eye. The heather mosses, in profusion, creep along the bottom of the hedges, or scale the trees, or steep their foliage in the running streams. The beardless mosses are on every bank; the hair mosses are sure to be found in the stone quarry: or if the collector

wish to extend his search, the river banks, the railway cuttings, the sand hills, the turf bogs, the heathery hill side, the gorse covered common, and even, in some places, the sea shore, below the tide mark, will each enrich his store with appropriate contributions ; and all that any of the species require to reconcile them to their change of situation is a little of their own soil, and a somewhat corresponding degree of shade and moisture.

Again, the great diversity of their seasons of fructification affords them an advantage in which no other single class of plants participates. It would be easy to arrange even a small case of mosses so that some of their number should be in their highest state of perfection successively in every month throughout the year. Though naturally, and without such a selection, the case would be in its most flourishing state during the winter months, just at the time when it is of most value from the absence of other plants. And this I regard as a very great recommendation. For there is more or less of pain in looking on a barren spot where flowers have been, even though we may know they will again come forth and flourish. But to see a constant succession of flower and fruit, one kind rising to maturity as another fades, this keeps up the interest, and renders a well managed case of mosses a never failing source of gratification.

These qualifications secure for the cultivation of mosses an interest which is of a popular kind ; but if a more scientific end is desired, it will also afford an almost exhaustless field for microscopic observation and physiological research. Of the mode of fructification in mosses just sufficient is known to make it plain that it involves a great secret, waiting to be found out by the first explorer who may bring sufficient ability to bear upon the subject. Of the functions of the *antheridia*, says the author of the 'Bryologia,' nothing is known by actual observation, but it is a well established fact that whenever they are absent fruit is never produced from the *archegonia*. It is the impression of the writer that most of the great physiological discoveries in phanerogamic botany were made on plants more or less in a state of cultivation. Possibly one of the reasons why we know less of the re-productive economy of mosses is because they have been thought too insignificant to be taken and watched by man under his own peculiar care.

Many kinds of mosses may be grown freely in the open air, without any protection beyond a shelter from the direct rays of the sun ; but they are liable to remain during the greater portion of the year in a shrivelled unsatisfactory state. We will therefore suppose that a Wardian case, of moderate dimensions, is to be provided, and apply ourselves to the question how it may best be procured and managed.

If it be intended to permit the plants to creep at discretion over the soil, a circular case has many advantages, and can readily be obtained by procuring a glass shade a foot or more in diameter. A conical heap of fragments of stone or coral should be made upon a zinc tray, and covered lightly so as to fill up the cracks, with a mixed soil; it is then ready for planting, and the tray being filled with water to the depth of half an inch, the shade may be placed over it. If in a case of this kind the larger upright mosses are set near the top of the artificial hill, the smaller species around them, while the feather mosses and other creeping kinds are suffered to wreath themselves about the lower portions, mingled with *jungermanniæ*, a miniature Alp will be formed, with its pines, its shrubs, and its vineyards: a living model of something grander, but not more perfect in its parts than itself.

But if it be an object to preserve the species separate, and with their names attached, a different plan must be followed. And for this purpose it is advisable to procure a sufficient number of flower pots of the ordinary shape, about two inches or more in diameter. These having been filled, half with fragments of tiles or small stones, and the remaining portion with soil; the mosses may be planted in them, and the pots placed upon the floor of the case; or if the plants be of moisture-loving species, the pots may be set in a shallow tray filled with water. Zinc labels are convenient and lasting, and a kind of ink proper for writing upon these may be procured at many of the chemists. The case for this method of cultivation should be square or oblong, and may be fitted up with shelves. It should by all means have a door for ventilation, and to give a ready access to the plants.

Some mosses prefer a vertical position, and seem to thrive best when they are attached to pieces of wood, or to a porous stone, and suspended in the case. Others require scarcely any soil, but attach themselves firmly to a flat stone, placed within the rim of the pot. Others again, as the *Sphagna*, require neither soil nor stones, but flourish when the pots are filled with their stems, and set in a tray of water.

All the species require frequent watering, which is best done by means of a syringe with a very fine rose. The inventor of closed cases, Mr. Ward, stated to me that he had found one rule of great value and of universal application in the cultivation of Ferns and Mosses, namely, to imitate Nature as closely as possible. But even this rule seems to admit of exceptions, for we sometimes find in Nature a liability to extremes unfavourable to the growth and even to the life of plants. To protect them therefore from such extremes, whilst in



other respects placing them as much as possible in the natural conditions of their growth, seems best to warrant the expectation of a favourable result. These considerations at once suggest that it is improper to have a case entirely closed. For nowhere in nature do we find mosses growing in a confined atmosphere. They do indeed prefer situations where the air is charged with moisture, and its circulation is much retarded. In these conditions, then, we must imitate Nature by providing a large moist evaporating surface, and by having a single moderately sized aperture in the case where mosses are growing.

The writer has had practical proof of the importance of attending to these conditions. On one occasion when both doors of the case in his possession were, by mistake, left closed for a considerable time, the mosses were many of them found in a mouldy state. At another, when both the doors had been left open during a high wind, the plants presented somewhat the appearance of dried tea leaves. In the former instance, an admission of fresh air soon dispersed the mould; in the latter, a shower from the syringe quickly restored the plants to their original verdure.

The scientific value of the cultivation of mosses, in a general point of view, corresponds with the importance of enlarged facilities for studying the habits of the species at all times. A few instances, however, may be given by way of illustration.

Many of the diœcous species are rarely found in fruit, owing probably to the male and female inflorescence rarely occurring in the same patch. *Bryum roseum*, one of the most beautiful of all the mosses, is an instance of this: the writer had a fine tuft of this moss growing with abundant *archegonia*. Mr. Wilson forwarded to him a number of plants of this same species with *antheridia*; they are now growing in contiguity, and it will be interesting to observe the result.

Mr. Wilson, during his late journey to Scotland, gathered on Ben Lawers, a moss which he thought might be *Hypnum Starkii*, hitherto not known as a British species. The fruit, however, was not found, and without it a satisfactory identification was impossible. The moss is now growing in the writer's Bryarium; should it fruit, and the fruit correspond with that of *H. Starkii*, a new species will be added to British botany. Several other mosses are also in cultivation in the Bryarium under circumstances similarly interesting.

Cultivation seems to develop, in some mosses, properties rarely or never seen in nature. *Hypnum elegans*, a species having simple fronds, becomes clothed with dense tufts of fibres, termed *flagellæ*.

showing under the microscope the structure of the stem, and the mode in which the leaves are produced, far more beautifully than any other portion of the plant.

Jungermanniæ should by all means be cultivated with mosses. They are rather more difficult to manage, but their great beauty well repays the additional attention they require. In the whole range of botanical science, it would be hard to find a more conclusive proof that there are, in Nature, assemblages by whatever name we recognise them, classes, orders, families or genera, in which the individuals have true and close affinity with specific distinction, than we have in the associated groups of mosses and hepaticæ, especially the jungermanniæ. For plants so small, the variety in form, texture, and colour, in mosses is surprising; the same may be said of the jungermanniæ. Many of the mosses, it might be said at a glance, differ from each other vastly more than they do from the corresponding species of jungermanniæ. Yet is there no confusion, no intermingling, no trace of the development of the lower into the higher form.

But if this be true, we have in the names we apply to the collective groups of these lowly plants far more than the distinctions formed by systematic botanists out of their own fancy, and for their own use. We have expressions of ideas originally existing in the mind of the Creator. Musci and jungermanniæ, hypnum and bryum, are no longer mere hard names, needful only for the student, but symbols of a thought existing before all worlds, and beaming into our sight, as we perceive that to none of the varied forms of jungermannia is given the capsule of the moss, and to none of the widely distinguished kinds of mosses the four cleft pericarp of the jungermannia.

And if we turn from the consideration of these less conspicuous distinctions to a comparison, which seems at first sight to suggest marks of contrast rather than of resemblance, we shall find the very same elements of beauty in the grandest and mightiest forms of vegetable life, and in the least. The pine and the cocoa nut, the banana and the date palm, the sugar-cane and the vine, have each a type in miniature amongst the ignoble tribes of liverworts and mosses. The same creative thought repeated, which is yet not the same, but only alike beautiful.

That we may see all this and infinitely more in Nature with true delight, we need before all other requisites the knowledge that the power and the wisdom which made and which sustains all, is not against us, but on our side. Revelation here assumes a teaching too vast to be entrusted even to the voice of created things, and proclaims

from heaven good will to man. Knowing this we cannot fail of finding happiness in all the infinitely varied stores of natural productions.

"A thing of beauty is a joy for ever."

And this we may equally realize whether we travel to distant regions and surround ourselves with whatever is grand and gorgeous, or whether, home unforsaken, we cull the objects of our choice from off the garden wall, in the passing streamlet, or from the fronds of living verdure which adorn the neighbouring mossy bank.

MEETINGS held on the 10th December, 1855,

ROBERT M'ANDREW, Esq., F.R.S., PRESIDENT, in the Chair.

EXTRAORDINARY MEETING: The following resolution, subject to confirmation at another meeting, was unanimously carried:—

"That the period during which Members may compound for Life Membership, at £5 5s., exclusive of Entrance Fee, be extended to the end of the present session, for Members admitted prior to the end of January, 1856."

## FIFTH ORDINARY MEETING,

HELD AT THE CLOSE OF THE ABOVE.

Mr. Ralph Hess was elected an Ordinary Member.

Dr. Thomson communicated to the Society the arrangements which had been made for the scientific voyage of the Rev. Dr. Scoresby, to Melbourne, in the "Royal Charter," s.s.

The Rev. H. H. Higgins exhibited a fine specimen of the *Agaricus ostriatus*; Mr. T. C. Archer, the seed of the *Hura crepitans*, from the West Indies, and two specimens of metallic currency of the Africans of Calabar, similar in form though different in size; he entered into an explanation of ring money, and shewed the connexion with Roman

Fibulæ and nose-rings (monilös). He also showed a large flake of Tragacanth, and explained his views respecting the probable mode of exudation and its cause. Mr. Marrat exhibited specimens of rare local mosses, and presented further evidence in favour of his views respecting the *Encalypta ciliata*.

The paper for the evening was then read,—

## NOTES ON A DREDGING EXCURSION TO THE NORTH CAPE.

By ROBERT M'ANDREW, Esq., F.R.S., F.L.S., PRESIDENT.

ON 10th May last (1855), I set sail from Liverpool in the yacht Naiad, accompanied by one of my daughters, my youngest son, and Mr. Marrat, whose valuable assistance in the department of Natural History I considered myself fortunate in being able to secure, but the state of whose health compelled him to leave me and return home from Oban. Having spent two or three days at Oban and likewise at the Sound of Skye, where, as well as at several points off the Orkney Islands, we dredged without any remarkable success, and after encountering a large proportion of contrary winds, we reached Lerwick in Zetland on 24th May. Receiving while there, proposals from Mr. Lucas Barrett, an enthusiastic young naturalist desirous of accompanying me to Norway, I was glad to secure his services, and delayed my departure an extra week for the purpose of enabling him to join me. This extended to seventeen days the time of our sojourn in Zetland, during which period I availed myself of every opportunity of dredging both in deep and shallow water, but did not meet with any species not previously obtained from the same locality. I forwarded some fine specimens of the large black *Holothuria*, "*Cucumaria frondosa*," to the Zoological Society of London, which reached their destination in apparently good health, but survived the journey only a very short time; their death being attributed to the circumstance of the temperature of the water of the Vivarium in Regent's Park having risen to 70° Fahrenheit, a condition certainly very different from that of their original habitat in Brassa Sound. In consequence of a paragraph which appeared in the London Newspapers, and was copied by the provincial press, announcing the arrival of Sea Cucumbers from Zetland at the Zoological Society's Gardens, enquiries were made of my people, whether it was really a new available vegetable! An indigenous edible cucumber would doubtless have been an acceptable addition to the limited productions of the not very genial climate of Ultima Thule.

Mr. Barrett arrived at Lerwick on the morning of the 10th of June,

and in the evening of that day we set sail for Drontheim, but the wind being light, it was midnight before we were abreast of the Noss Head, our point of departure. In the forenoon of the 11th, we attempted to dredge about 40 miles N.E. of the Noss Head, and obtained bottom in 80 fathoms, but the wind was too strong to admit of our working with effect in such deep water. During the afternoon and through the night, the wind was very fresh from S.W., with dull weather, affording no opportunity for an observation. On the morning of the 12th, it was so thick that we could see but a very short distance, and at 9 a.m., when, by our reckoning, we should have been 40 miles from the coast of Norway, we suddenly got sight of two small islands or rocks, right ahead, very near, and presently, the atmosphere becoming a little clearer, we discerned what appeared to be a high mountainous promontory looming over them through the mist. We shaped our course N.E. by compass, endeavouring to follow the line of coast, along which we sailed very rapidly, the wind continually increasing and the sea running high. Our situation possessed a certain grandeur, but was by no means free from anxiety, as we got sight in rapid succession of lofty headlands and islands and rocks. A boat was reported ahead, but it proved to be a small rock, and immediately afterwards we discovered breakers upon our weather bow, proving that we were nearer the coast than was consistent with safety; we accordingly stood off the land for some miles and then hove to, to reef sails and secure our boats upon deck. While thus engaged, one of the Norwegian vessels, called yachts, which trade along the coast bringing fish from the North and frequently returning in ballast, came in sight, standing to the N.E., and we determined to follow in her track. The weather cleared sufficiently to admit a view of the high mountain coast, in part covered with snow, while the opening of a fiord occasionally admitted to the eye a glimpse of more distant mountains clothed entirely in white. On the morning of the 13th, having laid-to a great part of the previous night for fear of running too far to the northward, we stood in for the land. The weather now nearly calm and clear, though showery, afforded a magnificent view of the great mountain barrier or rampart, of which the northern portion of the Norwegian territory mainly consists, presenting a singular contrast of black and white, the snow with which the mountains were perhaps half covered, not being confined to the upper regions, but distributed in large patches down to the sea margin. We made an attempt to dredge, but obtained no bottom at 170 fathoms. Soon after noon, being still far from the mainland, though at no great distance from a group of rocks, we were boarded by a pilot, who had come out a distance of some 10

miles in a very small frail boat, and from him we learned that, as we desired and supposed, the entrance to Christiansund (which forms likewise the south entrance to Drontheim) was before us. Being almost a perfect calm we progressed very slowly, drifting in as much by the agency of the swell as of the wind. In the evening we passed innumerable low rocks and a lighthouse, and at 10 p.m., being in a comparatively narrow channel, attempted to get soundings, but did not succeed at 150 fathoms.

After entering the inner channels, we had still above 100 miles of navigation before reaching Drontheim, and this, in consequence of the lightness of the winds, occupied us till the afternoon of the 15th. The scenery was very pleasing, consisting of wooded mountains, with cascades, increased by the rapidly melting snow, and low rocky barren islands, relieved by patches of cultivated land of the freshest possible verdure, with neat wooden buildings painted red or yellow, the roofs presenting the appearance of bright green, being coated with turf for the sake of warmth.

We were much struck with the town of Drontheim, so different in aspect from any we had before seen, being built almost entirely of wood, and containing many handsome structures of that material. Being painted externally they all have an appearance of newness and want of solidity which made it difficult to realise that we were in one of the oldest cities of the north, the residence of ancient Norwegian kings. The cathedral, which is the only building we remarked as belonging to past times, possesses great architectural merit, but is sadly defaced.

The position of Drontheim on the shore of a fine fiord, eight or ten miles in width, is very beautiful; and the river Nid, at the mouth of which it is situated, and by which it is more than half surrounded, is a fine stream flowing through a beautiful valley bounded by very remarkable natural terraces. There are two magnificent waterfalls upon the river, five or six miles from the city. We remained at Drontheim four days, on each of which, except the Sunday, I employed a few hours in dredging. The depth of the fiord was about 30 fathoms close to the anchorage with a muddy bottom, not the most favourable ground for mollusca, but I obtained there a few species, strangers to our own seas, viz., *Leda oblonga*, or *pernula*, *Yoldia lucida*, *Scaphander libraria*, *Patella caeca*, also a sea urchin allied to *Bryssus lyrifer*, and a starfish, both supposed to be undescribed.

In the afternoon of the 19th of June we were again under sail for the northward, having engaged a pilot, recommended by the harbour master as well acquainted with the intricate navigation of the inner passages,

as far as Tromsøe, beyond which we did not anticipate much difficulty in finding our way with the aid of charts. He proved most careful, attentive and obliging, and was always in good humour, his only defect being that of understanding no language but Danish or Norsk. This he began to get over after associating some weeks with the crew, and in the meantime the inconvenience was not so great as might be supposed, as it took but a short time to teach him the meaning of "luff" and "keep her away," two short phrases worth a whole vocabulary in practice, and by which alone he was enabled to direct the steering of the vessel through the most intricate and dangerous passages. On the 20th, we were for two or three hours exposed to a heavy swell from the ocean, but by noon were again under shelter, and at 3 p.m. came to an anchor inside the Vigten Islands, where I dredged in about 30 fathoms and obtained living specimens of *Scalaria Greenlandica*, *Mangelia nana*, *Margarita alabastrum*, *Trophon Gunneri*, &c. At midnight (if clear daylight can be so called), we continued our course, and at 8 a.m. passed the remarkable Island of Toorg Hatten, named, like the Dutchman's Cap in the neighbourhood of Staffa, from its resemblance, when seen at a distance, to what is popularly called a south-wester. Its height is probably ten to twelve hundred feet, and at about mid elevation it is pierced by a large cavern, through which we saw the daylight when distant a few miles. The weather coming on foul with wind and rain, we anchored an hour or two afterwards in a good harbour, much resorted to by coasting vessels, opposite to a pretty village and church called Bronoe, where we dredged in the afternoon with very poor success. The morning of the 21st was dull and cloudy, but it cleared up beautifully as the day advanced, when the weather was all that could be desired, and the scenery most grand and varied; indeed nothing could be more enjoyable than the evening and night which followed. We were dredging from seven o'clock to half-past ten at night in 80 to 200 fathoms water, and obtained for the first time *Terebratula cranium*, also *Arca raridentata*, a *Pecten* of which I have not seen a second specimen, *Pleurotoma nivale*, and a new species of *Triforis*, the largest of the genus. Early the next morning I was upon deck after an absence from it of only four hours; indeed we almost grudged having to go below. The scenery continued most beautiful, but I will not attempt to describe its features, to which I am so little competent to do justice. We passed the arctic circle early in the morning, and anchored at noon at an Island called Omnaes Oe, where I again occupied the afternoon in dredging, while others of the party were employed in catching fish and shooting Eider ducks and other sea fowl. The temperature was warm, (rising to about 60° Fahrenheit,) and in the evening a few mos-

quitoes made their appearance on board. The following day being Sunday we landed, intending to walk, but could only climb, so rough and totally pathless was the face of the country. The mountains were covered with a profusion of beautiful flowers, many of them belonging to berry bearing plants.

25th June.—Got under way in the morning and dredged in 70 to 120 fathoms, procured *Pleurotoma nivale*, a young specimen of *Buccinum fusiforme*, &c.; but the weather being very cold and rainy sailed only some 14 or 15 miles, and then anchored in a narrow channel among low islands,—dredged in 4 to 10 fathoms, obtaining *Natica Helicoides* and *Cochlodoma pratense*, living, but nothing else worthy of note. On the 26th the weather continued so bad that we were unable to dredge, but sailed about 35 miles to Bodoë, a trading station of more pretensions than any other we had seen since leaving Drontheim. The following morning I dredged with the boat for a few hours before getting under way, and obtained numerous shells, consisting of *Mangelia turricula* and allied forms, *Trophons*, *Admete crispa*, and *Trichotropis borealis*; we here first met with *Astarte arctica* and *Margarita cinerea* alive, also a *Lyonsia*, supposed to be a variety of *L. arenosa*, Møller. We set sail about noon, the weather and scenery most beautiful. The Loffodden Islands soon came in sight, giving to the distant horizon a sharply serrated outline. We picked up at sea a cask, which proved to be filled with fishermen's buoys, made of glass. The evening being very clear and nearly calm, the younger members of our party went off in the dingey to collect the eggs of sea-fowl from the low islands and rocks which we were passing, and afterwards remained on deck to see the midnight sun begin to rise without having set. The next day (28th) the weather again came on thick, with strong wind, and we anchored near the northern extremity of the West Fiord, as is named the channel which separates the range of the Loffodden Islands from the mainland, and which is much resorted to for its fisheries. We sailed again early on the 29th, and at 2 a.m. on the 30th reached Tromsø, the first place north of Drontheim which could be called a town, and here we remained two days, one of them being Sunday. It has a very neat and cheerful appearance, the buildings, of course, wooden, and the warehouses built upon posts, over the sea. On the Sunday afternoon many parties came off to see the yacht; they were, in general, very well and fashionably dressed, and proved that the art of the laundress is even here carried to great perfection. We had entered the province of Finmark, and now first came in contact with the primitive races of Quains or Finns, and Lapps, habited in their quaint costume of deer skins. The former constitute the resident



peasantry of the extreme north, and appear to be industrious fishers and cultivators of the soil. We saw among them no signs of abject poverty, and their habitations, though frequently built partly of turf, and far from large, did not appear to be so utterly destitute of comfort as those of the inhabitants of the remoter districts of the Highlands, and more especially of the Islands of Scotland. The Lapps, inferior in stature and physical qualities to the other inhabitants of the country, are entirely nomadic in their habits; their whole property consisting of reindeer, with which they migrate in summer to the more northern pastures, and their dwellings, something between the hut and the tent, are extremely rude.

At Tromsøe we had but little success in dredging, the channel in front of it being narrow, with a rapid current, but by examining the shore at low water, we obtained abundant specimens of *Astarte arctica*, *Crenella discors*, *Buccinum cyaneum*, *Natica clausa*, &c. The weather we found rather warm, though the snow lay in large patches down to the sea margin, and in the course of a walk along the side of the valley opposite to the town, we had to cross a ravine upon snow which served as a bridge over a roaring mountain torrent.

The distance from Tromsøe to Hammerfest is about 120 miles, and occupied between two and three days, including the time spent in dredging, and at anchor on account of fog. Glaciers, of which we had hitherto seen but few and at a distance, now formed a striking feature in the scenery, which likewise derived a peculiar character from the natural terraces or raised beaches extensively developed on all sides, which have been noticed by travellers, and are minutely described by Mr. Robert Chambers, in his "Tracings of the North of Europe." We were especially struck with the scene in sailing through a passage called Kaag Sund, in front of the lofty Kaagen Island, with its lap full of snow, supplying material for a glacier, as well as for a beautiful cascade of considerable breadth; while its foot was occupied by a camp of Lapps, with their numerous herd of reindeer. They appeared to be in the act of migrating, as some were encamped on both sides of the sound, and one of the reins was being swam across behind a boat.

Early in the afternoon of 4th July, we anchored at Hammerfest, said to be the most northern town in the world. The coast scenery of the immediate neighbourhood is fine, though the mountains are of lower elevation, probably not more than 1000 to 2000 feet; the country behind is likewise interesting, containing pretty lakes and beautiful cascades, notwithstanding which the situation and appearance of the town itself is the least prepossessing that I have seen in Norway, the

place being small, and situated close under a barren looking ridge, with large patches of dirty snow within a stone's throw of the houses. This snow had all but disappeared when we finally left the place about three weeks later. The staple trade of Hammerfest, and indeed of all Finmark, is stock-fish; all the sea beach near the town is occupied with groves of poles across which they are suspended to dry, tied two together by the tails. All the warehouses appeared to be full, and all the ships in the port loaded, or being loaded with the same commodity. The smell which strongly pervades the anchorage, and even the neighbouring heights, according to the direction of the wind, is of fish, fishy.

The point which runs out from the east shore, affording shelter to the harbour, is occupied by a fort, but dismantled; near it has been erected an elegant monument, marking the northern termination of the great arc of the meridian, measured from the Danube to the Arctic Ocean, an enterprise executed under the auspices and with the co-operation of the governments of Russia, Sweden and Norway. The erection consists of a pillar, the pedestal of carved granite, the shaft of the same material polished, and the capital of bronze, surmounted by a bronze globe representing the world, with the land, mountains, &c. in relief. The workmanship was executed in Russia, and it has an inscription in the Scandinavian and Latin languages, stating some particulars of the great work of such importance to science, which it is intended to commemorate.

The climate of these regions appears to be particularly favourable to the preservation of animal and vegetable substances. It is well known that stock-fish is cured by simple drying in the air, and at the house of Mr. Robinson, the British consul, I tasted reindeer meat in the third week of July, perfectly sweet and savoury, after having been hung for eight months without salt, or having undergone any process of curing. The wooden buildings are likewise of extraordinary durability, and even the posts driven into the bottom of the sea on which warehouses are supported, appear to be entirely free from the attacks of those minute animals which are so destructive in many, if not all of our own ports, and the mischief occasioned by which may be seen by inspecting at low water the wooden piers at Southampton and Beaumaris.

The climate in summer is by all accounts subject to great variations of temperature, the heat being occasionally extremely oppressive, when the mosquitoes are represented to be almost insupportable; but during the whole time, about three weeks, which we spent in Hammerfest and the neighbourhood, the weather was cold, the temperature very rarely above 50° Fahrenheit. Notwithstanding the high latitude (near 71°),

the sea always continues free from ice, and the inhabitants are accustomed to fish through the whole winter without appearing to suffer in their health from exposure to severe cold. The cattle appeared well conditioned, though small, the cows standing only about three feet high.

While at Hammerfest, I as usual employed part of my time, nearly every day, in dredging, either in the bay where the depth was from 20 to above 30 fathoms, or outside, in 50 to above 100 fathoms. I obtained several interesting specimens, among others, for the first time, *Rhynconella Psittacea*, also the *Embla Korenii* of Lovén, *Cerithium metula*, and *Cardium elegantulum*, a beautiful and rare *Goniaster*, and one or two other starfishes supposed to be new.

One afternoon while I was occupied with my favourite pursuit, my young companions landed on an island called Hogen, which rises in the form of a wedge to the height of probably 700 to 800 feet, terminating in a perpendicular precipice. It contains a surface of several square miles, but no trace of man or beast could be discovered upon it, though it was clothed with a luxuriant vegetation, and many beautiful flowers, including our own Forget-me-not, appeared here doomed "to waste their sweetness in the desert air." On another similar occasion Mr. Barrett and my son made an excursion to the top of the highest mountain in Qualoe, (the island on which Hammerfest is situated,) and overlooking all the land to the north of it, they enjoyed a most extensive prospect. The height I should estimate at about 1500 or 1600 feet; in the ascent they found the remains of a reindeer crushed between two masses of rock.

The communication between Hammerfest and the rest of the world is mainly dependant upon a line of government steamers which leave Drontheim at alternate intervals of a week and a fortnight during the summer season, calling at numerous stations. They perform the voyage with great regularity, and notwithstanding the very intricate nature of the navigation, during a period of fifteen years no serious accident had occurred till the time of my visit to Hammerfest, when the packet, which should have arrived there on the 9th of July, became disabled by running in a fog upon a rock, the consequence of which was that a period of three weeks elapsed without the receipt of any post from the south of Tromsøe. A steamer constantly runs during summer between the last named town and the north-eastern stations, going round the North Cape as far as Wardhaus on the Voranger Fjord, a frontier garrison of the Russian territory. Although this is the only fortification I heard of north of Drontheim, I do not suppose it capable of offering any very effectual resistance in case of a hostile attack, at least

if it be true as stated to me, that, upon occasion of the birthday of the late King of Sweden, even the firing of a salute occupied two days, which was explained by the circumstance that the age of the monarch being above 80 years, it required that number of discharges, and these could only be effected by the garrison at intervals of half-an-hour.

Having waited two extra days in the hope of receiving letters by the missing steamer, we departed on the morning of the 11th of July, on the most northern section of our tour, having determined to sail but a short distance on each day, and to occupy as much time as we conveniently could in dredging. It was accordingly on the afternoon of the 13th that we weathered the North Cape, having worked hard in the interval, and procured several interesting mollusca, such as a fine live specimen of the new *Triforis*, numerous specimens of *Margarita Alabastrum*, *Lamellaria prodita*, &c. We were fortunate in having fine smooth weather for doubling the great northern promontory, which is a grand and imposing object, about a thousand feet high, and perpendicular, with deep snow lying in some of the hollows and ravines. We anchored at the head of a bay or rather small fiord, which, from the east side, runs southward about five miles. The wind being light, we landed about 7 o'clock in the evening, before the yacht had reached her anchorage, in order to go to the top of the cape, which we found to be a much more arduous, not to say dangerous, undertaking than we had anticipated, having no guide to direct us as to the easiest or best way of accomplishing it. The landing was extremely bad, among large slippery masses of rounded rock, and after it was accomplished, (not without some of the party getting up to their middle in the sea,) we had to scale a precipitous mountain side, large fragments of stone, loosened by our hands or feet, occasionally thundering down to the imminent peril of any of the party who might be so imprudent as to be behind. After attaining a considerable elevation, our progress was easier, through a tract covered with stunted brushwood, and afterwards over a barren waste abounding with Ptarmigans and Golden Plovers, of which, as Mr. Barrett carried a fowling piece, we managed to bag one or two. A pool of water occupying a hollow among the hills, we walked across upon snow covered ice. Here, as upon various other occasions, we observed the phenomenon of pink snow, the discovery of which by arctic voyagers some 40 years ago excited much interest. It was after reaching the cape itself that the real danger existed, as it is very subject to dense fogs, and had one of these come on, we should have found ourselves in the very unpleasant predicament of having to remain where we were, at the risk of perishing from hunger and exposure should it continue for a few days, or attempting to return, when escape

from being dashed to pieces among the precipices would have been little short of a miracle. We were however fortunate in the weather, which continued very fine, and thought ourselves amply repaid for any risk by the sublimity of the scene. Near the point of the cape is a small erection, which we afterwards learned to be the depository of a bottle, in which it is customary for visitors to place their names. I regretted that I was not aware of the circumstance at the time, having reason to believe that it was the first instance of the ascent having been accomplished by a lady. We returned on board about 11 o'clock at night. The sailors had found some fine young gulls of a very large species, two of which I succeeded in taking home alive, and they are now in the Zoological Society's Garden, Regent's Park. The quantity of fish they consumed was something wonderful, and made their keep rather a serious matter.

The following day was windy and unfavourable for dredging. In the evening we anchored to remain over Sunday in Kielvig, a small bay, surrounded by precipitous mountains apparently inaccessible, but not so in reality, as we experienced no great difficulty in scaling the ascent and taking a walk upon the high tableland. At the extremity of the bay was a little level ground in terraces, formed by ancient sea beaches, allowing space for a church, a house, and a very few cottages. The occupier of the house was very civil to us, and spoke a few words of English; from him we learned that service in the church was only performed occasionally, the visits of the clergyman being made at distant intervals. The trade of the place consisted as usual in the curing of stock-fish. Upon the beach I picked up a large *Fusus*, since ascertained to be the true *F. Islandicus* of Chemnitz. It is more than double the length of adult specimens, from the same locality, of the British species, (*F. gracilis* of Costa,) supposed by Middenderf and the author of the *British Mollusca* to be a variety of it; it contained the animal, and had evidently been brought in by one of the fishing boats.

On the 16th of July, I went out in the boat to dredge, when I obtained little, only one small shell, probably a *Cardium*, with which I was not acquainted. Set sail at 10 a.m.; as soon as clear of the land lay-to to dredge. The dredge was first put down in 34 fathoms which produced very little; next in 50 fathoms, from which it brought up a quantity of beautiful coral, (*Retipora*,) and *Serpula Vitrea*; the third time it found bottom in 90 fathoms, the depth increasing rapidly to 150, from it we obtained specimens (one each), of *Buccinum Dalei*, and *B. Falsiforme*; also a fine live coral, of which some years ago I procured a crushed specimen, or rather part of one, from the deep water

east of Zetland, and which was described by Dr. Gray under the name of *Flabellum Macandrei*. The principal shells in addition to those above-named, were *Yoldia lucida* and *Arca raridentata*. The wind increasing so as to be too strong for deep sea dredging, we ran up Porsanger Fiord, and anchored for the night in a bay on the west side of it. On the 17th, after attempting to dredge, without success, on account of the strong wind, we anchored about noon under an island called the Great Tamsøe, the proprietor of which immediately came on board to invite us ashore and to his house. The lady was Scotch but had left her country at an early age, and there was a numerous family, including grandchildren residing in this remote region, surrounded by the comforts of civilized life, and as well dressed as the better classes generally are in the large cities of Europe. Having been told that there was a remarkably fine breed of reindeer on this island with four fingers thickness of fat upon them, I commissioned my mate to endeavour to purchase one. He accordingly landed, accompanied by my son, (Mr. Barrett being indisposed,) and they shortly returned in a state of great excitement, particularly the youngster, to say that they had agreed to give six dollars for a reindeer, and might select any one they liked from the herd, but must shoot it themselves, and had accordingly come to fetch the rifle. At the mention of deer shooting Mr. Barrett thought himself better, and made one of the party, which landed in high glee, but after an absence of two or three hours returned somewhat crestfallen and bringing with them a live sheep, but a poor substitute for the fat reindeer, being so lean that after it was killed and the skin removed, my skipper remarked how well it would serve for a masthead lanthorn. It appeared that in their hurry they had taken pistol balls by mistake, which of course did not fit the rifle, and the consequence was, that after a walk of several miles and a fatiguing chase, they were unable to bring down a reindeer, and gave two dollars for the sheep rather than return empty-handed.

We did not meet with any favourable ground for dredging in the Porsanger Fiord. On the 18th we saw, for the first and only time, a Russian vessel, many of which were in the habit of frequenting the harbours and fishing grounds of these parts when the sea was open to them. The one in question kept close along shore on the further side of the fiord from us, probably not much liking our appearance. We anchored for the night in Magerøe Sound, where, having some traffic with the Finns for the purchase of a few provisions, we had an opportunity of viewing the interior of one of their dwellings, which, though sufficiently contracted and not over clean, shewed signs of comparative wealth. Their possessions consisted of cows, goats, and ewes, from the

mingled milk of which they were making cheese; a loom for the weaving of coarse woollen cloth, and a boat for fishing; in addition to which resources they collect abundance of the eggs of gulls, &c., in the season, and down from the nests of the eider duck.

We had generally a choice of first-rate harbours for our anchorage at night: on the 19th came to at Maas Oe or Island, and on the 20th at a place called Axlen, in Bustad Sound; the latter a very remarkable harbour, the entrance being narrow and shallow (three fathoms), but opening into a spacious basin of such depth that we were obliged to go very close to the shore to find so little as twelve fathoms. We saw no sign of habitation in the neighbourhood, but at the extremity of the bay appeared an opening, as though to an inner basin, which we did not explore. We reached Hammerfest in the evening of the 21st July, and after enjoying of the receipt of letters and newspapers from England, sailed again, southward, on the 24th. We arrived at Tromsøe on the evening of the 26th, and left it again in the afternoon of the following day. Having passed through the whirlpool or rapid called Ry Stromen, it fell calm as the evening advanced, and when we were drifting astern through the effect of a contrary tide, we dropped the kedge anchor in order to hold on till circumstances should again become favourable to our making progress. Seeing just opposite to us a high and picturesque mountain we were tempted by the calm serenity of the evening to try the ascent of it, not knowing till after our return that it was called the Bensjordstind, and the height ascertained to be 4000 feet.

It was eight o'clock in the evening when we landed, and immediately commenced the ascent. This we at first found to be exceedingly precipitous through a wood, of which many of the trees were prostrate, and in various stages of decay, and a most luxuriant growth of grass, ferns, and flowering plants, among which we climbed principally by means of our hands. After perhaps 1000 feet perpendicular of this laborious work, the ascent became easier; small scattered trees marked the limit of the wooded region, beyond which the herbage was short, of Alpine character, with many beautiful flowers. The rock was of *Mica Schiste* with abundance of garnets, but as we approached the summit, granite protruded in huge blocks and masses, among which the ascent was very steep and difficult. Although this mountain is situated three degrees within the Arctic circle, we had accomplished fully 3000 feet of the height before reaching a patch of snow, which is the more remarkable from the circumstance of some being seen at the sea level, and resting upon the raised beaches in the immediate neighbourhood.

We had made for the sharpest peak, thinking it the highest, and it

was only after attaining it that we perceived the one to the eastward to be rather higher, though the difference of elevation was not considerable. The view was one never to be forgotten. At the back were considerable tracts of snow, with glaciers descending from them. In front we looked over high mountainous islands, separated from us only by a narrow sound, to more distant islands and rocks, and the ocean beyond them all. We saw the city of Tromsøe to our right, and fine fiord scenery to our right and left; but the sun was the grand object by which our attention was as it were absorbed. It was just twelve o'clock when we reached our highest elevation. The sun, which at this late period of the summer went a short distance below the horizon to the inhabitants of the lowlands, did not so to us, a space equal to about half its diameter appearing to intervene between it and the sea. I have seen the sun rise from a greater elevation, from the summit of Etna, while the planet of the morning was still visible, and the neighbouring towns and villages, with the city of Catania, were still in obscure twilight; but I was never so impressed with the glory of our great luminary as on this arctic midnight, when it appeared to combine the beauties of sunrise and sunset, and cast a ruddy glow over the rocks and snow among which we stood.

On regaining the region of trees on our way down, we found the vegetation, which had been perfectly dry at the time of our ascent, wet with a heavy dew, and at four o'clock we returned on board the yacht, already under weigh.

We anchored to spend Sunday, 29th of July, not far from a station called Kloven, in Sengen Island, where the country, less mountainous, was verdant and wooded, forming a beautiful natural park, and reminding me of the lake scenery of England. The next day (30th), I got a successful haul of the dredge in 150 fathoms which produced *Limopsis pygmæa*, the first time it had been obtained in a recent state, being only hitherto known as a fossil of the crag: it forms an addition to the interesting list of mollusca which inhabited the seas of England, or where England now stands, at the time the crag formation was deposited, but which have since retired into higher northern latitudes; together with it came up two very rare species of small *Pectens*, *Chiton alveolus*, &c.

On the 2nd of August, at Omnaes Oe, we first found to be ripe the wild berries which were in flower when we were on our way northward, and which thenceforward, till our departure from Norway, formed a welcome addition to our daily bill of fare, being produced almost everywhere and in great abundance. On the 3rd of August, we repassed the Arctic circle; dredged a second specimen of *Buccinum fusiforme*, and two



very fine specimens of *Yoldia limatula*, not previously known as a Norwegian species, but obtained from Spitzbergen and North America. At the Vigten Islands, on the 4th, I met with a dead specimen of *Cypræa Europæa*, which I do not believe to be found further north, also *Margarita cinerea*, of which this is probably the extreme southern limit in the European seas. On the 6th of August I had down the dredge, which appeared only just to touch the bottom with 250 fathoms of line, when suddenly it began to take hold very hard, appearing to travel up the side of a steep rock. Upon hauling it up, it was found to contain four large cream-coloured masses of siliceous sponge, one of them bearing some resemblance to a man's head, only larger, with short hair. On reaching home, I sent them to my friend, Mr. Bowerbank, who, by the labour and study he has devoted to the subject, has constituted himself the best authority upon the *Spongiada*. He declared them to be the most interesting objects he had met with of the family, that they were of two, if not three species, all quite new, of the extremely rare genus *Geodia*, and that the examination of them has thrown additional light on, and established new facts with reference to, the organisation of this the lowest form of animal life, at variance with the opinions previously entertained. In company with these remarkable sponges came up a fine live specimen of *Lima excavata*, its dimensions truly gigantic, being  $5\frac{1}{2}$  inches by  $4\frac{1}{2}$  inches, larger than those in the cabinet of Mr. Cumming and of the British Museum, which are the only specimens I am acquainted with; also *Arca nodulosa*, &c.

We reached our anchorage at Drontheim, in the afternoon of the 8th of August, when we learned that during the eight weeks that we had been absent, not a drop of rain had fallen, and the heat had been extreme, greater than had been experienced within the memory of the oldest inhabitant, represented by an individual 90 years of age. Not a particle of snow could now be seen from the town or anchorage; the river Nid, which at the time of our former visit overflowed its banks, was now shrunk far within its channel, and the numerous beautiful cascades which then adorned the sides of the mountains had disappeared. The harvest was now at its height through the neighbouring district, the fields where the corn was out presenting a singular appearance, from its being the custom to suspend the sheaves upon poles to expedite the process of drying.

We sailed from Drontheim on the 10th of August, but it was the evening of the 13th before we were fairly out at sea; passed a remarkable group of rocks called the Grib Hoelen, which extend a considerable distance. We were surprised to see on the largest of them a village of many houses, with a church, as it seemed liable to be swept away by

the sea, of which the surf beat high over the neighbouring rocks, apparently quite as elevated.

We encountered very heavy weather which moderated on the 15th, and being then upon the Zetland banks, (land about 40 miles distant, visible from the masthead,) we tried the dredge in 100 fathoms and procured numerous specimens of a small rare *Echinus*. We were afterwards much delayed by calms, and on the morning of the 17th, in a thick fog, we found ourselves close to the land of Fair Isle, lying between Orkney and Zetland, and distant about 20 miles from each. From some of the natives, who came off to us in a boat, we learned that the inhabitants numbered about 330, and that, in consequence of not being included in any post-office arrangements, they are entirely dependent upon vessels which may happen to pass that way, or upon a visit to the Orkney or Zetland Islands, for information of what is passing in the outer world. They possess a church and a Wesleyan methodist chapel, but no resident clergyman of any persuasion. We had been ourselves so completely out of the range of anything like news that we were unable to gratify the poor islanders with any of that commodity; but a glass of grog to each partially consoled them for the disappointment.

We experienced a continuance of baffling weather till the afternoon of the 19th, when being off Cape Wrath, we encountered a heavy gale from the westward. After laying to for some hours, and several seams of our mainsail having given way and been ripped open, we ran for Loch Errebol, which we entered in company with nearly 30 other vessels, like ourselves going there for refuge. Early in the morning of the 21st, our sail being repaired, we once more put to sea, but two days later, on reaching the Sound of Mull, we again encountered strong head winds, when, having spent a whole fortnight in our passage from Drontheim, my patience became exhausted and we put into Oban, whence on the following morning we took the steamer to Glasgow and rail to Liverpool.

In concluding, I will add a few words upon the general results of the cruise in a Natural History point of view. During the two months that we were in Norway, I dredged upon an average at least four hours a-day except Sundays, and owing to the fineness of the weather, the advantage of being nearly always sheltered from the ocean, and the continuous light of the sun, (which during five weeks never went below the horizon,) I was enabled to work more in deep water of between 100 and 200 fathoms than on any previous occasion. The total number of species obtained of shell bearing mollusca only reached about 195, which shews the diminution in the number of species as we proceed north-

wards. Of them about 20 are not included in Lovén's Index of the shells of West Scandinavia, and six or eight are supposed to be entirely new; 159 have been found in the British seas, 83 extend to the north-coast of Spain, and 69 range as far south as the Mediterranean. Of the 70 species common to Britain, but not extending to the north coast of Spain, 45 are only found in the more northern of our seas, or in an arctic patch near the south coast of Ireland; and of the 83 species ranging to the south of the Bay of Biscay, about 40 per cent. disappear northward before reaching the province of Finmark. Of *Echinodermata*, as well as of *Crustacea*, *Sponges* and *Zoophytes*, I have not yet received a particular report from the parties to whom I entrusted them for examination, but am assured that they contain species of great interest. Of land Mollusca we only saw three species, viz.: *Helix arbustorum*, *H. fulva*, and another small snail, I think *H. crystallina*: the first by far the most common, and extending to Finmark.

I may mention, for the guidance of collectors, that I had been recommended Glycerine mixed with water, as a good medium for the preservation of animals in a soft state, as it possessed the peculiar advantage of retaining their colour, but I did not find it to answer in general, the animals decomposing in it, except the *crustacea*, and many even of them came to pieces.

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MEETINGS held on the 7th of January, 1856.

ROBERT M'ANDREW, Esq., F.R.S., PRESIDENT, in the Chair.

EXTRAORDINARY MEETING: The resolution of the 10th ult. was confirmed.

SIXTH ORDINARY MEETING: The President, in conformity with a resolution of the Council, called the attention of the Society to the loss which they had sustained in the death of Joseph Brooks Yates, Esq., and submitted an address of condolence to the family, drawn up at the request of the Council by the Secretary:—"That this Society having received from the President the announcement of the death of Joseph Brooks Yates, Esq., desire that an expression of their pro-

found sorrow be recorded on their minutes, and conveyed to the bereaved family. As one of its founders, the deceased claimed the respect of the Society: and this became the private feeling of the members from those qualities which eminently distinguished him. To an untiring zeal was added the matured experience of years, which led the Society to receive his counsels with attention; while his extensive knowledge of belles-lettres and the fine arts enabled him frequently to lay the fruits of his researches before the Society. Thus did he doubly earn the devotion of the Society which now mourns his loss."

This resolution was unanimously adopted.

It was announced that the Council had elected the Rev. A. Fischel a member of their body; and the Society determined to postpone filling up the vacancy in the Vice-presidency till the following meeting.

Mr. Charles E. Rawlins, jun., was elected an Ordinary Member.

The paper for the evening was "ON THE INSTRUMENTS USED IN THEIR OBSERVATIONS BY THE LIVERPOOL COMPASS COMMITTEE," by J. T. Towson, Esq.

## SEVENTH ORDINARY MEETING.

ROYAL INSTITUTION, Jan. 21, 1856.

F. W. BLOXAM, Esq., in the Chair.

Dr. Thomson announced that the resolution of the Society referring to the death of Joseph B. Yates, Esq., had been conveyed to the family, and gratefully acknowledged.

Mr. F. Yaniewicz's resignation of membership was accepted.

Mr. L. Hardman was elected an Ordinary Member.

The Society proceeded to elect a Vice-President in room of the late Mr. J. B. Yates. A ballot having been taken, equal numbers were found in favour of the Rev. H. H. Higgins and Mr. T. C. Archer; whereon the Chairman was called to give his casting vote: this being given in favour of the gentleman present, Mr. T. C. Archer was elected.

Richard Brook, Esq., F.S.A., made a communication on the barbarous punishments employed by our ancestors, instancing the duck-

ing-and-out motions in females. He referred to its use here in 1779, and more recently elsewhere. He denied the legal power which a magistrate or coroner has to impose such repulsive and dangerous punishment.

Surviving of the Squares of the Squares involved by Mr. M'Andrew were exhibited by Mr. T. M. Archer and Mr. Bowley.

The papers in the evening were then read —

## ON THE SUBSTITUTIONS OF THE NEW RED SANDSTONE BETWEEN THE FIFTH HILL AND THE UP-THROW OF THE HILL NEARLY EAST OF LIVERPOOL.

TRANSLATED BY HENRY.

BY A. E. M. D. N.

THE physical features of the district between these points, extending seventeen miles from west to east, is characterized by five ranges of hills running near north and south across the line of section. They form a coarse parallel with the strike of the sandstone strata of which they are composed, the principal faults being all due north and south.

Fifth Hill, the northern extremity of the range, at the western side of which occurs a bold escarpment to the west, the base being fringed with a narrow deposit. The base at the east is much more gradual in consequence of harder beds of sandstone dipping in that direction. Between this hill and the Falsely range there exists a wide valley, marked by two slight eminences at Grimsby and Upton, raised by rocks thrown up by the sandstone from under the "red mud". The Falsely Hills are similar to the former range, with an escarpment to the west, and the more gradual one to the east. This range is formed of a different series of beds of the new red sandstone to those which contribute to the formation of the hills at the north of the Dee, the mass of these similar forms arising from both being composed of hard beds of sandstone dipping eastward, resting upon strata of a much softer consistency dipping out to the west, the soft material has been denuded, the overlying beds broken abruptly off, leaving a steep incline westward in each case.

The River Mersey occupies another valley. To the east the town of Liverpool is situated upon a terrace of a range of hills that obtain their greatest elevation, 600 feet, at about one and a half miles from the river. Beyond Edge Hill, after a depression of the land deeply covered with boulder clay, there rises a bold ridge, Olive Mount, about 800 feet above the level of the sea, which gradually sinks eastwards. There is then a valley crossed by the railway from Broad

Green. Near Roby the ground rises again; this elevation terminates near Huyton, which is situated upon another slight eminence. Between the latter and Huyton Quarry the land is rather depressed, the flaggy sandstone of the coal strata is then elevated about fifty feet; half a mile to the east, where the section ends, the railway is carried over an embankment.

#### SUPERFICIAL ACCUMULATIONS.

The summits of the hills in this district are unusually barely covered by a vegetable mould, the rock projecting through it in many instances. In all the valleys and depressions there are deposits of sands, clays, &c., in some cases attaining a thickness of 90 or 100 feet. The superficial accumulations may be conveniently divided into four groups, referable to as many different periods of formation; if they were all present in any one section they would be presented in the following order:—

The uppermost,

1	1. Sands, clays, and gravels of marine origin, containing remains of existing local species, human art, &c. Locality—Mouths of the Dee and Mersey, and north of Wirral, where there is a submarine forest.
2	2. Boulder clay or northern drift, containing bones and recent shells, the lower half full of boulders. Locality—Throughout the neighbourhood.
3	3. Pleistocene, sands, and gravels, containing recent shells. Locality—Seacombe, Egremont, &c.*
4	4. Red and yellow sand, &c., being the washings of the new red sandstone. No organic remains. Locality—Huyton, east of Liverpool, &c.

#### NEW RED SANDSTONE.

Under these deposits of debris, throughout this neighbourhood, there is a distinctly developed series of sandstones and marls, upwards of 1500 feet thick, that from their super-position, mineralogical composition, and the faint traces of life embedded in them, have long ago been referred to the Trias or new red sandstone of English geologists. It forms the base of the mesozoic or secondary period; the materials that compose it were accumulated immediately after those great changes had been effected which marked the close of the palæozoic period.

\* Underlying the boulder clay upon the shore, it yields to the action of the water and is causing a fearful waste of the coast between these places.

The system in England is divided into two divisions, the uppermost the keuper, "variegated red marl," being the repository of rock-salt and gypsum; the lower, the bunter-sandstone, being an extensive series of "variegated red sandstones."

In Germany the system is divided into three divisions:—keuper, muschelkalk, bunter-sandstein; and each of these have been recognized in France.

The German terms, used to distinguish the upper and lower divisions, have been adopted in our English nomenclature; but the central group—the muschelkalk—is altogether absent in Great Britain. The new red sandstone rests upon the permian system, which usually separates it from the coal measures, but in some parts of the country it is absent, the new red sandstone lying uncomfortably upon the coal strata. The system is perhaps more developed in Cheshire than elsewhere; it is represented in the vertical section, the sub-divisions being delineated. *See vertical section.*

It is only very recently that any attention has been paid to the sub-divisions, especially those of the bunter formation. We are principally indebted to Edward Hull, Esq., F.G.S., of the Geological Survey of Great Britain, for bringing the subject before the attention of geologists, and thereby causing them to be coloured upon the maps of the survey (quarter sheets 79 N.E. and 79 S.E.) I must not omit this opportunity of acknowledging how much I am indebted to that gentleman for the very liberal manner in which he has aided me in investigating this subject.

The sub-divisions of the new red sandstone possess such distinctive mineral characters as will identify them over the whole of the area occupied by that formation; each of them are developed in this district, and are crossed by the line of horizontal section. Of those of the keuper, the red marl is about 100 feet in thickness, the base only being present. The waterstones, the base of the keuper, 350 feet. The sub-divisions of the bunter sandstone are all present entire, and have furnished the depths laid down in the vertical section.

400 feet upper soft red and variegated sandstone.

300 „ coarse red sandstone and conglomerate.

400 „ lower soft red and variegated sandstone.

giving 1100 feet, and a total of 1550 feet as the thickness of the new red sandstone system in this neighbourhood. This is the approximate result ascertained by following the dip of the strata over measured sections: it is liable to some slight error or uncertainty on account of minor faults and bendings of the strata, but upon the whole may be considered very near correct.

From the observations of Mr. Hull, in the Memoirs of the Geological Survey, the "upper and lower soft red and variegated sandstones" are absent about the south Staffordshire coal field. The waterstones there rest directly upon the "coarse red sandstone and conglomerate;" and from observations he made at the Liverpool meeting of the British Association, when he exhibited the survey sheet 79, containing Wirral, &c., and a section across it (but which has not been published), these two sub-divisions thin out as they approach the midland counties, but are plainly developed from Lancashire to the Malverns, along the borders of Wales, so that the new red sandstone is more fully represented and much thicker in its western parts. The "waterstones," and middle "coarse red sandstone and conglomerate," seem to be continuous, and to extend, with some slight modification, throughout its whole area.

#### SECTION FROM THE RIVER DEE TO HUYTON.

The horizontal section represents a line drawn from the mouth of the Dee, across Wirral in an easterly direction, through Liverpool, and then by the line of the Liverpool and Manchester railway to the east of Huyton Quarry. It passes over all the sub-divisions of the keuper and bunter formations of the new red sandstone, and it is almost at right angles with the faults and general strike of the strata. It consequently possesses considerable advantages over sections taken in other directions where the keuper would be excluded. The denudation has been very much less about the extremity of Wirral than anywhere else in the neighbourhood. The section extends over the distance of seventeen miles, being drawn upon a scale of one inch to a mile; the depth 600 feet below high water level, and the elevation over it is upon the scale of the eighth of an inch to every 100 feet. In the absence of any correct measurement the heights of the highest points are set down as being 800 feet.\*

Rather more than a mile from the eastern shore of the Dee there is a small island, or rather point of rock, this is near the western extremity of the section; at no remote period it must have formed a part of Hilbra. Altogether there are three islands connected by rocks only covered at high water. They are all composed of the "coarse red sandstone and conglomerate" of the bunter formation. It dips to the N.E. at an angle of six degrees. On the S.W. of the two larger islands a true conglomerate crops out at the base of the cliffs. It is composed of fragments of white sandstone, probably derived from the upper coal measures at no great distance, for they are sharp and angular. There are also quartz pebbles imperfectly rounded, but of these and other

\* The heights quoted are from Baines's "History of Liverpool."



primitive rocks there are comparatively few. The base is a yellow sandstone reposing upon a band of arenaceous clay. The superincumbent beds are generally deeply tinged with per-oxide of iron, but in many places it changes both horizontally and vertically into a light brown or yellowish sandstone with quartz pebbles. The conglomerate of Hilbre has not been identified in any other position; it probably belongs to the base of the sub-division, but thins out to the east. A fault (No. 1 in horizontal section) must of necessity exist in the bed of the Dee, between the islands and the Cheshire shore, for the "lower soft red and variegated sandstone" is thrown up and can be observed in many sections about West Kirby. It consists of a very soft red sandstone, so friable that it cannot be used as a building stone: there are not any clay partings, but joints cross it in many directions. Near the top of Beacon Hill it dips under the "coarse red sandstone and conglomerate." Two faults (No. 2.) throw up the strata to the east several yards. The latter rock covers the top of the hill and continues for three-quarters of a mile. Rough, uneven, and scarcely covered by the vegetable soil, several good sections present themselves, the hard rock containing pebbles and small nodules of clay is divided every few yards by bands of marl and light sandstone a few inches thick, characters that serve to distinguish it throughout the line of section. The strata decline at various angles from six to fifteen degrees to the east, under the "upper soft red and variegated sandstone." This last sub-division is visible near the base of the hill, and at Frankby it has been ascertained to dip eastwards. West of the village of Greasby a fault (No. 3), with a north and south strike (a direction applicable to all the dislocations intersecting the section), throws down the "keuper" about 350 feet. The waterstones, on which the village is built, dips under the red marl at five degrees east. A little further a fault (No. 4) brings up the "waterstones," and again at Upton a dislocation (fault No. 5) with the same result is repeated, the "red marl" then continues to the Fender, a stream near the village of Ford, when it is faulted against the "upper soft red and variegated sandstone" (No. 6). The "red marl" extends over near two miles from west to east, and covers six square miles of surface, but there are very few places where it is visible. The best openings in it at present are at Upton, Woodchurch, and Irby. It usually consists of thin layers of laminated arenaceous marl, indurated and breaking into cubical fragments, but probably more solid when not exposed to the atmosphere. At a small section east of Woodchurch the strata dip to the west. The base of the "red marl" at this place occurs of the general dull red colour, with bluish-white bands, ripple marked, as at Upton. In the

Woodchurch section I found the pseudomorphous crystals of chloride of sodium, described by H. E. Strickland, Esq., F.G.S., in the ninth volume of the Quarterly Journal of the Geological Society; they are found on the under surfaces of the laminae of marl, not being crystalline in their character, they are composed of the same substance, and pass gradually into it. The crystals are supposed to have been formed in salt water marshes communicating with the sea and spring tides. The sea water having been left by a retreating tide, had time to evaporate and to deposit crystals of chloride of sodium. When the tide afterwards returned to the spot, the water, not being saturated, would dissolve the saline crystals, leaving cubical cavities in the hardened mud containing them, which would be then filled with a new layer of the "red marl." Their occurrence so generally in the English keuper seem to indicate a very shallow condition of the sea, often laid bare during the intervals between the tides, and having been discovered in many localities, from the Mersey to the southern extension of the keuper, they furnish, with the ripple marks and reptilian footmarks, additional evidence of the shallow waters and subsiding sea bottom of the upper new red sandstone period.

A little way to the east, at the base of the Bidston range, the "upper soft red and variegated sandstone" crops out; it here consists of yellow sandstone, being the upper bed of the sub-division. The yellow sandstone is seen reposing upon red beds of the same rock at the Red Noses, near New Brighton, and of the latter there is a good section appearing from under the yellow beds to the west of Oxtou, where it is a uniform soft red sandstone, without pebbles or partings of the beds. This range of hills is capped with the "waterstones," consisting of white, yellow, and red sandstones, with beds of clay or marl. The basement, however, consists of thick beds of sandstones, containing quantities of quartz, pebbles, and nodules of clay. These seem to be connected with the conglomerates, breccias, and calcareous concretionstones of other localities, which are referred to the base of the keuper. The strata generally dip to the east in the line of section, or rather northwards of that point at very slight angles, 2 to 5 degrees. The lower beds of "waterstones," the conglomerates, can be seen at Bidston and Oxtou, the middle at Stourton, the upper beds at Greasby and Upton. The "muschelkalk" of German and French geologists would come in between the beds at this part of the section—the "upper soft red," &c. &c. and the "waterstones." The junction between these subdivisions can be examined with more minuteness than that of any of the others; but there is no trace of any period having elapsed after the termination of the former and before the commencement of the latter:

the passage beds are gradually blended into each other, so that the "muschelkalk" must have been a contemporary formation, dependent upon some peculiar causes.

Further east there is a fault (No. 7) throwing up the lower beds of the "coarse red sandstone and conglomerate" to the base of the "waterstones" about 700 feet. Birkenhead is situated upon this, the former sub-division. It dips eastward at angles of 8 and 10 degrees at Tranmere, where there are numerous points of observation. It consists of hard red sandstones, separated at intervals of every 3 or 4 yards by bands of a whitish friable sandstone, and sometimes of marl: pebbles occur throughout. With very few exceptions the building stones used in this neighbourhood are procured from the "coarse red sandstone" and the "waterstones"—the red from the former, and the white, used for public buildings, from the latter. Under Birkenhead the sandstone is obscured by drift. It can, however, be seen at each side of the Mersey, which flows over it. At Liverpool the Dock works, and that part of the town to the west of the Custom-house and Exchange, cover it. There is then a fault, (No. 8) a down-throw to the east, bringing in the "upper soft red &c. &c." upon which a considerable part of the town is situated. At St. James's Cemetery it is covered by the "waterstones"; the basement beds can be seen there. Further east, just at the outskirts of the town, (by Shaw-street, Chatham-street, &c.) there is a great up-throw fault to the east (No. 9), about 700 feet, bringing up the "coarse red sandstone, &c., the base being about level with that of the "waterstones." The numerous quarries open along the side of the hill caused by this great up-throw of hard sandstone, render great facilities for examination. The lowest visible beds are probably those near Kirkdale, where a light coloured sandstone, with pebbles, much resembles that of Hilbre Island; if the conglomerate is present it is only a few yards lower down. The sandstone retains its usual character, and declines east for two-thirds of a mile at an angle of about 3 degrees.

In the valley beyond Edge-hill this sandstone sub-division dips under the "upper soft red and variegated sandstone." East of Wavertree Bridge the strata is obscured by a considerable depth of boulder-clay, that fills the hollow caused by denudation. Approaching Olive Mount there are two or more faults, the "coarse red sandstone" being thrown up to the east (No. 10): a fine section is obtained from the railway cutting. The marl partings can be traced for considerable distances, when they either thin out or become blended with others. The strata are very similar to that of other places; it dips to the east, and beyond Broad Green becomes invisible beneath the superficial accumulations of the valley. There is little doubt but that the hard sandstone is covered by the

uppermost sub-division of the bunter. Quarter of a mile to the west of Roby the "coarse red sandstone" is again thrown up (No. 11); there is a large quarry section near the station where the beds are seen dipping south-east at about 10 degrees. The sandstone is similar to that of Olive Mount, quartz pebbles being abundant. Further east the level sinks into a narrow valley, which indicates the line of an extensive fault that brings up the "lower soft red and variegated sandstone" to the surface (No. 12): this rock forms the hill upon which Huyton, or more especially the church, is situated. It is exposed in a large quarry opposite the Blue Bell, on the Liverpool and Prescott-road: it is a fine grained yellow sandstone, traversed by joints, without any pebbles. There are no divisions into beds or layers, and it is rather difficult on that account to ascertain the correct dip, but it appears to be westerly, contrary to the usual direction.

Between Huyton and the Quarry station, an attempt was made some years ago to sink for coal through this sandstone, or to drive a level from the shaft across the fault into the coal measures, but it failed on account of the great quantity of water.

The great dislocation that has thrown up the coal-measures intersects the railway about 300 yards to the west of Huyton Quarry (No. 13). The coal strata there visible is composed of hard grey flagstones, interstratified with beds of shale. This rock is well known about Bury and Rochdale, where it always covers the upper portion of the lower coals.\* It is the summit of a vast dome of sandstone strata, with the sides dipping N.W. and S.E., over the latter repose the coal fields of Halsnead and Huyton; on the N.W. the coal has been cut off by the dislocation and left under the new red sandstone, where there is no doubt it is spread out at great depths beneath the surface. The depth of the coal strata removed by denudation from above the Huyton flagstone may have amounted to 2000 or 3000 feet, as remarked by Mr. Cunningham years ago; so that the tremendous up-throw of the coal-measures is apparent. A person is now engaged near Huyton Quarry, and has sunk three shafts, in order to obtain coal from beds upon their rise from the fault N. W. of the Huyton anticlinal. With the first shaft but little coal was obtained; the other two are nearer the fault, but so far have been unsuccessful, no coal having been found. Nothing could be expected in such a situation except a few yards brought up by the fault from the ends of coal beds underlying the new red sandstone, *without sinking to a considerable depth*† below the Huyton flag-stone.

\* Mr. Binney's "Geological Journal," vol. 3.

† I am indebted to Mr. Charles Wells, of Huyton, for his assistance during my examination of the eastern extremity of the section.

## CONCLUSION.

The sub-divisions of the new red sandstone, but more particularly of the bunter formation, is a subject that soon may become of considerable economical importance. At the present time, when the consumption of coal is so immense that the period of its comparative scarcity must be drawing nearer, and it being generally considered almost certain that under the new red sandstone system throughout England, the coal measures are spread out entire; it is even now becoming an important question as to how far we may be able to avail ourselves of such supplies by sinking through the bunter sandstone; and resting upon the strong probability of such concealed treasures existing under the new red sandstone of this neighbourhood, it is very desirable to know which are the best positions for ascertaining the fact, in case of such an investigation being carried out by boring through the superincumbent strata.

If these estimates of thickness and the extent of fractures caused by the faults are correct, we find that, although it would be extremely injudicious to sink through the keuper, or the upper sub-divisions of the bunter, yet by doing so in those places where the basement beds are brought to the surface by faults, it is very probable that workable beds of coal would be reached at a moderate depth; but before entering upon such an undertaking, due allowance must be made as to the possibility of permian strata intervening, or an unprofitable thickness of the upper coal measures to be passed through.

The absence of the permian strata in this neighbourhood is a most important circumstance in connection with this subject. If it had existed beneath the new red sandstones we might have expected some indication of it along the margin of the coal strata to the east of Liverpool, or more especially between Huyton and Sutton, the coal measures having been thrown up three times in that direction, but there is no trace of it.

The sub-divisions having been clearly made out, the spots are indicated where we must either find the permian or the coal measures, upon boring some 400 or 500 feet through the basement beds of the new red sandstones.

The other paper for the evening was then read—

ADDITIONAL OBSERVATIONS ON ICE IMPEDIMENTS TO AUSTRALIAN VOYAGES, AND THE PROBABLE FATE OF THE "GUIDING STAR;" by J. T. Towson, Esq.

## EIGHTH ORDINARY MEETING,

ROYAL INSTITUTION, February 4th, 1856.

ROBERT M'ANDREW, Esq., F.R.S., PRESIDENT, in the Chair.

The following gentlemen were elected Ordinary Members:—Mr. John Cunningham, F.G.S., Mr. Henry Duckworth, and W. Valentine Bird, Esq., M.D.

Mr. T. C. Archer exhibited an Indian helmet, made from the pith of the shola stem. It was very light, tough, and a bad conductor of heat, qualities which highly recommended it for use in that country.

Dr. Ihne read the first part of his paper entitled—A PLEA FOR THE EMPEROR TIBERIUS.

## NINTH ORDINARY MEETING,

ROYAL INSTITUTION, February 18th, 1856.

WILLIAM IHNE, Esq., PH.D., VICE-PRESIDENT, in the Chair.

The following gentlemen were elected Ordinary Members:—Mr. Henry V. Rudd, and Mr. James M'Cann, F.G.S.

The paper for the evening was then read—

## A PLEA FOR THE EMPEROR TIBERIUS.

BY W. IHNE, Esq., PH.D.

## CHAPTER I.

THE Emperor Tiberius Claudius Nero was descended, on his father's and mother's side, from the Claudian family, which, in a nation characterised by unbending determination, haughtiness, pride, and all the stern but none of the gentle virtues of our race, was without doubt the haughtiest and proudest of all, and transmitted these unamiable qualities,

like an heirloom, from father to son. When a Claudius was carried to the family vault under the capitol, and his bier was followed by the long procession of mourners, who, according to the solemn and impressive custom of the Roman people, represented by dress and mask the line of noble ancestors of the house, then among the numerous dictators, consuls, censors, and triumphators, the wondering people would not fail to point out to one another the sullen figure of the Decemvir Appius Claudius, stained with the blood of poor innocent Virginia and with his own; they would note the blind Appius, who, with genuine Roman stubbornness, had counselled to refuse the proffered peace of the victorious Pyrrhus, unless he previously left the soil of Italy; and P. Claudius Pulcher, whose overbearing spirit defied not only the authority of human laws, but the revered institutions of the national religion. They would relate to their children how this man, in command of a Roman army and fleet, was routed with terrible loss, because he had engaged the enemy in defiance of unlucky omens, and had added insult to sacrilege by saying, "If the sacred birds would not eat, they should be thrown into the sea that they might drink." And this man's sister, when her chariot was once delayed by a crowd in a narrow street, uttered the impious prayer, that her brother might return to life and lose another battle to rid the city of the too numerous rabble. There were, it is true, great statesmen and great warriors in the illustrious Claudian house, but none of amiable virtue or kind disposition, none popular with the great mass and happy in the sympathy of their humble fellow-citizens. The stern countenances of all these men wore something of the "Claudian scowl and sneer," and with some truth the Romans might say—

"That brow of hate, that mouth of scorn, marks all the kindred still,  
For never was there Claudius yet, but wished the commons ill."

If such was the spirit that entered into the composition of Tiberius' character, his education and the scenes that surrounded the boy did not tend to soften a temper naturally hard and sullen. He became, by the second marriage of his mother, the stepson of the Lord of Rome. The boy was keen enough to see through all the hypocrisy of Augustus, and the never-ceasing intrigues of his mother. Unfortunately Augustus had no children by Livia, but he had a daughter by Scribonia, his first wife. Upon her his paternal affection was concentrated. She was married to Agrippa, the friend and most faithful servant of Augustus. Tiberius and his brother Drusus were visibly neglected and shut out from all hopes of succession, more especially when three sons of Julia seemed to promise perpetuity to the house of the emperor. But an

evil spirit was at work to blast the hopes of the Julian family. Livia had determined to raise her own sons to the throne, and, like a true Claudian, she shrank from no measure to accomplish this object, and she never despaired of success. Agrippa died, and to approach one step nearer to the throne, Tiberius was compelled to divorce a wife he loved, and to marry the profligate Julia whom he detested. Now began a period of humiliation for Tiberius, calculated to turn the lightest heart to sullen misanthropy. Augustus had never loved him; his licentious wife scorned him, and hated him as an upstart and an intruder; her sons, by Agrippa, petted and pointedly marked out and distinguished by Augustus as the heirs next to the throne, slighted and openly offended him, their stepfather; his mother, Livia, for ever plotting and conspiring, used him merely as a tool, by which she hoped to govern the empire after Augustus' death. He left Rome in disgust to live in retirement in the island of Rhodes, where literature, philosophy, and especially his favourite astrology, formed his exclusive occupation. He was almost forgotten in the capital; slighted by all, offended with impunity, he found himself sinking by degrees into obscurity and neglect; his voluntary absence from Rome became compulsory. He was now anxious to return, but met with the stern refusal of Augustus. At length, after the lapse of seven years, the emperor yielded to the entreaties of Livia, and permitted Tiberius to return to Rome. Now his prospects brighten: his two eldest stepsons die in rapid succession; his wife had, during his absence, so openly disgraced the imperial house by her notorious licentiousness, that Augustus, with a bleeding heart, was compelled to banish her, his only child, from the capital.

Tiberius was now in the prime of manhood: Augustus, deprived of the friends of his youth, bereaved of all those of his own family to whom he had looked for support in his declining years, was compelled to lean on his stepson, whose courage, tact, and skill had been tested on many occasions. Tiberius was adopted by Augustus, and invested with such powers as left no doubt that he was destined to be the successor to the imperial purple.\* And so efficacious were the means taken to secure this end, that no hereditary king ever stepped more noiselessly and securely into the throne vacated by his predecessor, than Tiberius did at the death of Augustus.

He had now reached the mature age of fifty-six, the exact period in which the eventful career of the first Cæsar was cut short by the daggers of the republican conspirators. Had he also died at this age it might indeed have been as great a misfortune for the Roman world, as the

\* Tacit. Annal. I. 3.



years of confusion, anarchy, and bloodshed which followed the murder of Cæsar, but his fame would have remained fair and bright; he would have been reckoned among the benefactors of his country, and his premature death would have been lamented as a national calamity. Now he is branded in history as a "despicable and detested monster,"\* because he was not happy enough to die before he obtained supreme power.

The disposition to think and speak evil of others, at all times powerful in the human heart, was perhaps never so rampant as during the period of national decay, of moral, political, and religious degeneracy, which accompanied the establishment of the Roman Empire. It thrived under the incubus which oppressed freedom of speech. No act of those in power, no event that could be coloured with a criminal hue, escaped the slanderous tongues of that depraved generation. No crime was so black and horrible, no misdeed so gratuitous or mad, no folly so absurd, but it was eagerly credited and spread in a society from which all holier impulses of our nature were erased; which knew of patriotism, self-devotion, justice, piety, and purity of life only from the scarce credited annals of bygone days,—which was sunk and lost in epicurean selfishness, in the most abject servility and the grossest superstition. If a man of eminence died unexpectedly, his death was sure to be ascribed to the dagger or to poison, even when not the slightest evidence of violence could be adduced. Nor were these suspicions confined to the vulgar. We see them at least hinted at and insinuated by the most respectable historians of the time. Not only the premature deaths of Marcellus, of Caius† and Lucius, the adopted sons of Augustus, and presumptive heirs of the Empire, were darkly imputed to the "fatal stepmother of the Augustan house," but Augustus himself, though he reached the extreme limit of human life and infirmity of age, was believed to have fallen at last a victim to her deadly craft.‡ Nothing surely would have been more gratuitous than to kill a dying man. The succession of Tiberius was an irrevocable necessity; there was nobody to contest the empire with him.§ Why should Livia, after having waited patiently so long, have suddenly

\* Hume.

† Tacit. Ann. I. 3. Of Tiberius' opinion of Caius we may judge from a passage in Velleius II. 101, (C. Cæsar tam varie se gessit, ut nec laudaturum magna nec vituperaturum mediocri materia deficiat). We are bound to suppose that Velleius knew the mind of Tiberius perfectly well, and did not write a single word to displease his patron. The qualified praise therefore which he bestows on Caius is trustworthy evidence of the Emperor's disposition towards Caius. Compare also Vell. II. 103.

‡ Tac. Ann. I. 5. Et quidam scelus uxoris suspectabant.

§ It is perfectly true what Velleius says, II. 103:—Neque enim quaerendus erat quem legeret (Augustus) sed legendus qui amiebat.

wished to accelerate the sure course of nature by committing such an awful crime ? None but the most irrefragable evidence can induce us to give credence to the ridiculous story.

At any rate Tiberius cannot be implicated in this crime, if crime there was. In all the long-spun intrigues of his mother, during which one obstacle after another was removed between Tiberius and the throne, he seems to have been a passive instrument in her hand. Not for his sake, but to gratify her own ambition, and to rule the world in the name of her son, the haughty Claudia worked for many long years with the greatest recklessness and perseverance at the one object, which she finally attained. She was too little of a woman to have much maternal love for her son. No wonder Tiberius was wanting in filial affection for his mother. He disliked her, but he could never emancipate himself from fearing her. There never was either cordiality or intimacy between the two. Pride, if no higher motive, prevented Tiberius from conspiring with Livia. If crimes were resorted to, to secure the succession to her son, however acceptable they may have been to him in their result, it is not likely that he had a hand in perpetrating them.

It is possible that we may extend this verdict to a deed which, foul as it was, became the melancholy alternative between which and great public calamities a choice had to be made. The third of the sons of Agrippa and Julia, Agrippa Postumus, was still living, and had been adopted by his grandfather. To this step Augustus was prompted more by his natural affection for his own family, than by a due concern for the happiness or safety of the empire. For it appears that the youth so nobly born, and by the adoption of Augustus exalted to such pre-eminence, was coarse, insolent by nature, and without any education or refinement. Relying like a gladiator on his bodily strength, he exhibited such a ferocity of disposition, that Augustus was compelled to remove him from Rome to the small island of Planasia, where he was under military surveillance.

Agrippa had clearly by right of blood a better title to the throne than Tiberius. There is no doubt that he would easily have succeeded in collecting a formidable party, and in disputing for a time the supreme power with Tiberius. But it is quite certain that the latter would have finally prevailed, and that the horrors of civil war would have been conjured up in vain. It was therefore fortunate for Rome that Agrippa was put to death immediately. He fell unpitied and unrevenged. Some supposed that Augustus himself had given the bloody instructions ; but it is more probable that Livia had her hand in this dark transaction ; nor is it likely that Tiberius disapproved of a measure which freed him from a competitor, however contemptible.

The scenes which were now enacted in Rome stamp with everlasting infamy that aristocracy and people, once so proud and jealous of their liberty, and they show us how hopelessly and irretrievably the days of republican freedom were gone for ever. Consuls, senators, knights, all vied with one another in showing the most abject servility to the new ruler. With ignoble emulation they eagerly rushed into slavery. Nor were rank, nobility, or wealth able to guarantee an independent position, or to prompt freedom of speech; they were, on the contrary, additional motives for cowardice. Not actions only and words were studied to conciliate the favour of the new master, but the very features were guarded from offending him by showing either too much joy or too much sadness. The death of Augustus seemed to require the latter; the accession of Tiberius the former, and between this Scylla and Charybdis of conflicting emotions, the abject hypocrites endeavoured to make their way to the favour of a man they hated and dreaded.

Before acknowledging that he accepted the fulness of power vacated by the death of Augustus, Tiberius repeated a farce which his predecessor had enacted before him. He pretended to desire repose. "Other and better men, he said, might be chosen to share at least with him the burthen of government, to which he felt to be alone unequal." Not one of those who listened to these insincere words could be mistaken as to their real import. One fear pervaded all, lest they might show that they knew the Emperor's true sentiments. They therefore implored him with tears and prayers to take pity on them, and not to forsake the helpless Empire. Such were, at that wretched time, the constitutional forms which accompanied the demise of the crown.

Before we condemn Tiberius for proceedings which are so degrading in our eyes, we are bound to consider the circumstances by which he was surrounded.

The desire to possess power over others is such a general weakness of the human heart, that few have ever withstood the temptation of seizing it, who felt it to be within their grasp. History, therefore, has generally been lenient in her judgment of usurpers, and has reserved her severest censures for those recreants only, who either overthrew free institutions, or sacrificed innocent blood in their struggle to obtain it, without being actuated by any higher motives than selfishness or ambition. In modern Europe, the law of succession is happily so firmly established and so well regulated, that a contested succession\* is almost

\* Gibbon, c. 7.—The superior prerogative of birth, when it has obtained the sanction of time and popular opinion, is the plainest and least invidious of all distinctions among mankind. The acknowledged right extinguishes the hope of faction, and the conscious security disarms the cruelty of the monarch.

beyond the range of possibility. The king never dies; but it took a long time before this law was elaborated into a code, and obtained by the sanction of civilized nations the irrefragable authority which it now possesses. The annals of the feudal ages exhibit an afflicting picture of civil confusion and bloodshed, of national misery and disgrace caused by the reckless ambition of man aspiring to dominion. To be just, we are bound to compare Tiberius, not with the kings of the house of Stuart or Hanover, nor with the Hapsburgs or the Hohenzollern, but with the Plantagenets, the Yorks and Lancasters, and with those Emperors of feudal Germany who had to conquer and maintain the crown with their swords. Compared with such men, aye, and with others less deeply stained with the blood of foul murders, whom we rank among great if not good princes, the stern Roman will appear in no unfavourable light, even if the murder of Postumus Agrippa should lie at his door. And infinitely superior must we pronounce him to his predecessor and model, Augustus, and to the majority of oriental despots, Macedonian kings of Syria and Egypt, and to the despicable tyrants who usurped monarchical power in the small Greek commonwealths. These were the precedents and models from which alone his code of morality could be formed, with the aid of a degenerated religion and a powerless philosophy. And if a foil is wanted to throw out into still stronger relief, the comparative purity of the second Emperor of Rome, it is furnished in gloomy abundance by a long line of wretches who succeeded through blood and civil war to a throne they dishonoured without any redeeming qualities. With such comparisons and analogies as correctives for our judgment on Tiberius, we shall not condemn too severely the force by which he, the inevitable ruler, obtained from the servile senate the shadow of an elective title. There have been in our own days popular elections, the result of which was not less prejudged by military force than the suffrages of the Roman senate; and ceremonies quite as unmeaning and impotent in every practical point of view have been hallowed in this well governed country by the reverence which we cheerfully bestow on time-honoured though empty formalities.

## CHAPTER II.

IF the spirit of freedom and the very thought of opposition had departed from the Roman people and the Roman senate, it became soon evident that the army, the source and instrument of the Imperial power, felt its importance, and claimed the right of sanctioning, if not the continuance of despotism (for that was established beyond recall), at least the selection of the new despot. The pure patriotism of the citizen

was gone. The mercenary spirit of a mutinous soldiery henceforth arrogated to the camp the functions of the Council Hall and the Forum. The momentum of the scale had shifted from the civil to the military side, and the sad deterioration of the motives and sentiments in the new military organisation must have filled the heart of a true patriot with despondency. The legions of Pannonia and the Rhine broke out into open mutiny at the news of the death of Augustus. But their object was not the restoration of liberty, or of the glorious commonwealth of the Scipios and Catos; they seized the opportunity for claiming higher pay and shorter service, and when they had obtained their selfish demands for the moment from the perplexity of Tiberius, they were ready to serve him in his task of completing the organisation of the Imperial despotism.

The Rhenish legions at that time formed the most formidable army of the empire. They were eight in number, a body of not less than 100,000 men, provided with all the necessities of war, ready at any time to take the field and to protect the Roman provinces from the dreaded attacks of the German nations. They were commanded by Germanicus, the son of Drusus and nephew of Tiberius, a man of considerable ability and greater promise, the favourite of the army and of the Roman people; one of those men whose fame has gained by an untimely death, and by the contrast which the imaginary purity of his hoped-for reign was expected to present to the rigor and unpalatable severity or the misfortunes of that which preceded. The fond hopes of the oppressed always discover somewhere a deliverer from present evils, and are ready to invest him with all the qualities they desire. Should death intercept him before he has a chance of realising these expectations, he reaps the additional harvest of praise which is generously bestowed on the departed.

We have no wish to depreciate whatever merits Germanicus may have possessed. Our chief task is to show the futility of the charge or insinuation that Tiberius caused his death; but historical justice demands equal measure for all, and we cannot but come to the conclusion that hitherto Germanicus has received as much his overdue of praise as Tiberius has been ungenerously curtailed of his just claims.

Germanicus was the son of Nero Claudius Drusus, the younger brother of Tiberius, who died from the effects of a fall from his horse, whilst commanding an army in Germany. Thus placed by birth in the immediate neighbourhood of the throne, he was selected by Augustus as one of the supporters of the new dynasty and of the new order of things. By his desire Tiberius adopted his nephew, although he had a son of his own, little younger than Germanicus.

The uninterrupted friendship between these two young men, the natural and the adopted son of Tiberius, is one of the few bright spots of that gloomy page of history, and it goes far to redeem the character of the young Drusus, Tiberius' son, from the reproach which a natural coarseness and cruelty seem to fasten upon him. We can find no trace of jealousy between the two princes, whose equally balanced title to the succession might easily have roused the worst passions. Germanicus seems to have early shown a good deal of the martial spirit which distinguished his father, and all the ancestors of his illustrious house. In the Illyrian war, which was reckoned by contemporary historians the most dangerous to the supremacy or the very existence of Rome since the wars with Carthage, the young Germanicus held an inferior command under Tiberius, and seems to have acquitted himself very creditably. When the great defeat of the Roman arms in Germany, under Varus, called for an experienced leader in those quarters, Germanicus accompanied his uncle to the Rhine, and under his able guidance served a further apprenticeship in the very localities where his father had earned the surname Germanicus, to which the son might now hope to gain more than a merely hereditary title. Tiberius succeeded in averting from the Roman provinces a storm which seemed about to burst upon them, after having annihilated three entire legions. This object was accomplished without any brilliant military exploits, more by policy than arms. Division was sown among the German chiefs and tribes, and Tiberius returning to Italy left his nephew in the command of the finest army of the Roman empire.

If he had unlimited confidence in the honour and loyalty of Germanicus he was not deceived. It is evident, from the narrative of Tacitus, that Germanicus was unable to conceive the idea of supplanting his uncle, and that he shrank from the very mention of it as from a crime and a pollution. It is related that the mutinous soldiery offered him the crown; but that he was so horrified with this proposal that he drew his sword, and was scarcely prevented by his friends from sealing his loyalty with his death. In this sentiment he was sincere, and Tiberius must have given him credit for it, or he would not have left him in the command of such a formidable army for three years longer. We must insist upon this fact the more emphatically, as ancients and moderns have concurred in imputing fear and jealousy to Tiberius, when he at length removed Germanicus from the German legions and sent him to regulate the affairs of the East.

The true motives for this measure we shall not fail to discover, if we examine attentively the narrative which Tacitus gives of the several expeditions of Germanicus into Germany. We shall be compelled to

acknowledge that a justifiable solicitude for the safety not only of the Rhenish legions but also of the Rhenish frontier, for the reputation of the Roman arms, and for the resources of the empire, compelled Tiberius to put a stop to expeditions which led to no new acquisition of territory, but wasted the best blood of the Roman legions in inglorious combats with half-armed barbarians, and could scarcely be redeemed from the dangerous whispers of the capital by triumphant shows and falsified reports of successes and victories.

### CHAPTER III.

It was the dying wish of Augustus that the Rhine should remain the frontier line of the empire in the north-west. This desire was not the result of generosity or satisfied ambition, nor did it flow from the impression that Germany was a country not worth the honour of a Roman province. On the contrary, the attempt had been made to establish Roman rule permanently on the east of the Rhine, and it had failed so signally that the terrors of the Cimbric invasion were for a time renewed throughout Italy. We can hardly doubt that the cautious and peaceful Tiberius fully adopted the view of Augustus with respect to the Rhenish frontier, and it must have been no slight concession to the ardent spirit of the young Germanicus when the Emperor gave his consent to the renewal of hostilities which had hitherto proved so costly and fruitless.

The history of these campaigns has been described by Romans alone. If we had the national songs, in which, according to Tacitus, the Germans celebrated the exploits of their heroes, we should, no doubt, have a somewhat different version of the war between Germanicus and Arminius : but even in the one-sided reports of the Roman writers we see hardly anything but a long series of great efforts followed by failures and reverses, and ending in retreat and loss.

The first exploit of Germanicus was a sudden invasion into the land of the Marsi, whom he surprised during the night after a festival, when they had no suspicion of war. A horrid carnage inaugurated the recommencement of hostilities, in which, as Tacitus relates with cold blooded naïveté, neither age nor sex was spared, the unresisting enemies were cut down in their sleep, and the country for fifty miles was laid waste with fire and sword. The effect of such a massacre was to rouse the German tribes, and to inflame their patriotism with the fiercest spirit of revenge. They occupied the line of retreat of their enemies. Tacitus (An. I. 51) admits that the Roman light cohorts were thrown into confusion, but the heavy armed legions repelled the enemies and the army reached the Rhine in safety.

This campaign, if so it can be called, seems little calculated to have made Tiberius uneasy on account of the military glory it shed around Germanicus. Yet this feeling is attributed to him by Tacitus. And though he spoke in the senate in high terms of the services of his nephew, the historian says "he seemed not to be in earnest (!)" Such is the spirit of detraction with which almost every word and deed of Tiberius was interpreted by his contemporaries, from motives which it will be our duty to discover.

The second campaign was planned on a much more extended scale. Two armies, of four legions each, entered Germany, and after some desultory marches, some burning of wretched hamlets and massacring of women and children, the whole force was directed to the north, where, six years before, the army of Varus had been annihilated by Arminius. The difficulties of marching a large army through a country without roads, without even such towns as Gaul could then boast of, with hardly any agriculture, covered with impenetrable forests and endless morasses, must have been great indeed, so great that we may justly admire the skill and courage of the men who undertook it. We have witnessed too lately a gallant and well appointed army at a distance of a few miles from a port crowded with ships and supplies, reduced to the greatest privations and sufferings, and brought to the brink of destruction from the want chiefly of a very short road. How bold and skilful must have been those Roman generals who nearly two thousand years ago did not hesitate to plunge with large armies into the midst of such a country as Germany. Nothing, however, was neglected by them to insure the success of such a perilous undertaking. Forests, in which the axe had never perhaps been heard before, were for the first time opened by the Roman engineer, valleys were filled up, and solid roads for the tramp of large armies were constructed across treacherous bogs; strong camps and fortified places along the line of march offered safety in case of retreat, and were filled with stores of supplies. Nevertheless the difficulties were so great that the Roman generals, in spite of their aversion to the sea, and their want of skill and experience as mariners, availed themselves of the facilities of water carriage. They had managed to conciliate the tribes that dwelt on the sea coast. The ancestors of these men, afterwards so tenacious of their liberty and national independence, the Batavi, the Frisians, and Chauci, not only offered no resistance to the Romans, but sent auxiliaries and ships. Thus Germanicus was enabled to send half his army by sea to the mouth of the Ems, where he was joined by his legate Cæcina, with an equal force.

A mournful duty awaited the Roman legion. They were now near



the final spot where the whitened bones of many thousands of their enemies defined the last act of friendship at their hands. They traced the progress of that great calamity, the succession of camps from the first which had held the three unbroken legions, to the last where their miserable remnants had found a short respite, only to prolong the agonies of their death struggle. On the trunks of trees they saw the grinning skulls, the horrid trophies of the barbarians, and in the neighbouring graves still stood the altars on which the noblest of the Romans had died, an awful thank-offering to the god of war. Germanicus and his army performed the funeral rites. They collected the scattered remains of their countrymen under one huge mound. The general himself laid the first turf—the army shared his grief; but we may well be doubtful whether, as Germanicus intended, their indignation and the spirit of revenge raised them to greater courage, or, as Tiberius surmised, the awful sights they had seen, made cowards even of the brave. The results of the campaign seem to justify the latter supposition. A pitched battle was fought, which, according to Tacitus, remained undecided. This itself was equal to a defeat under the circumstances, and an immediate retreat became necessary. It is not easy to understand how a Roman army of eight legions, that is at least 60,000 men and about an equal number of auxiliaries, could meet any number of barbarous enemies without utterly annihilating them. The difference between the two hosts in point of military skill, organization, discipline, and arms, was not less than that between the English troops of Clive and the Bengalees. In fact it may be doubted if Cæsar and his Spaniards were as soldiers so far superior to the army of Marston, as the Roman legions were to the Germans. In skill, discipline, and courage the Romans were equal to the best troops of modern Europe. In their terrible piliæ the Germans had to oppose only long poles, sometimes without a metal point, and merely barbed by fire; the large Roman scutum, covered with a thick hide and much more, could be matched by the German only by a thin wicker shield; the Roman protected himself with helmet, breastplate, and greaves; the German offered his bare head and breast to the enemy. But he was brave and vigorous, at home on his native soil, in the thick forest, the morass, or the mountain side: and above all he was supported by an unbroken courage, and led to battle by a hero and a great captain. Arminius was not a barbarian; he had made at least one step towards civilization: he understood the art of war, which he had studied under the best masters. The Romans might have been proud of their pupil, but they had failed to subdue his free spirit, and to teach him servility and submission. His greatness was not apparent

on the battlefield alone; he showed his aptitude to lead and to command by the skill with which he united in one common cause a number of independent tribes, naturally jealous of, and often hostile to, one another; by the perseverance with which he successfully resisted the intrigues and hostility of his nearest relation, of his own brother, who served in the ranks of the Roman legions, and of his father-in-law, who was mean enough to surrender his daughter, the wife of Arminius, to Roman captivity. No ties of blood or love could hold his proud neck under the foreign yoke. Like an Abd-el-Kader or a Shamyl, he alone was a host in himself; he upheld the standard of freedom, and his countrymen flocked round it and set the conquerors of the world at defiance.

The successful resistance of the Germans to the Roman arms is the more surprising when we remember how short a period sufficed to reduce to complete subjection, not only the whole population of Gaul, but the hardy tribes which inhabited the inaccessible fastnesses of the Alpine chain, the rugged mountains of Illyricum, and the marshy plains of Hungary. One short campaign broke for ever the Celtic mountaineers of Noricum and Rætia, countries which, when afterwards held by Germanic tribes, earned by their heroic resistance to foreign aggression a paramount and peculiar glory as the noblest champions of freedom. The country between the Rhine and the Elbe was certainly more assailable than the mountain regions of the Alps, and we must therefore attribute the failure of Rome in these parts to the spirit of our Teutonic ancestors, and to the genius of their leaders.

The retreat of Germanicus was effected partly by sea and partly by land. Germanicus himself, with four legions, returned in his fleet; the cavalry was ordered to follow the margin of the sea; and Cæcina, with the remainder of the troops, made the best of his way to gain a high road or dyke constructed through the bogs of Hanover and Friesland, by L. Domitius some years before. But he was already preceded by Arminius. With the fate of Varus and his legions before their eyes the trembling Romans had at the same time to repair the dilapidated road, to throw up earthworks for the protection of their camp, and to resist the impetuous onset of their enemies. Driven in on every side they were only saved from destruction by the approach of night (Tac. A. I. 64). What a terrible night! Cut off, and surrounded by cruel enemies, in the midst of bogs and forests, they heard their wild yells of triumph and the songs of victory resounding from the neighbouring hills; they wanted repose, and could not lie down to sleep. The thought of the heaps of bones of their fallen comrades, which they had buried, unnerved them. Cæcina himself, who had seen forty years of

service, was terrified by the awful fate that seemed to await him. In his dream he saw the bloodstained figure of Varus rise from the morass and beckon him to follow. Thus superstition and fear seemed to combine for the destruction of a second Roman army.

A disastrous day succeeded this dreadful night. The Germans had turned all the streams of the surrounding hills into the plain and flooded the road. A panic seized two legions, who were stationed to protect the flank; they fled. *Two Roman legions fled (!)* and left the remainder with the wounded, the heavy baggage, and their general, to extricate themselves as well as they could. They were saved by the cupidity of their undisciplined enemies, who rushed to possess themselves of the plunder, and allowed the legions to escape. But so demoralised was that proud army, that in the following night a sudden panic seized it, and it would have been dissolved in a wild and disorderly flight, and certainly cut down to a man, if their grey-haired general had not thrown himself down on the ground before the fugitives, and thus at last prevailed upon them to remain in the camp. Here they were attacked in the morning by the Germans, whose impetuosity could not be restrained by the wiser counsels of Arminius, that they should allow their enemies to leave their camp and then attack them on their march. This time the discipline of the Romans prevailed over the untutored valour of the Germans; they repelled them, though not without great loss, and thus at length secured an unmolested retreat to the Rhine.

If such were the disasters of the four legions of Cæcina, Germanicus could not boast of greater success. He was compelled to land two of his legions, to lighten his transports. The poor fellows, thus left on a strange coast, were almost entirely overwhelmed and destroyed by a high tide. Those who were fortunate enough to escape to higher ground were again taken on board by Germanicus, and thus the remnants of this inglorious expedition at length reached the camps of the Rhine.

The greatest consternation prevailed here before their return. Rumour had increased their disasters. It was reported that the whole army was destroyed, and that the victorious Germans were approaching to invade Gaul, and if the manly spirit of Agrippina had not prevented it, the honour of Rome would have been stained by a mean act of cowardice, the destruction of the bridge over the Rhine.

How considerable must have been the losses of this campaign we may judge from an incidental observation of Tacitus, that Gaul, Spain, and Italy vied with one another to repair them. Can we wonder that Tiberius felt uneasy?—the cautious, careful Tiberius, sparing in all, especially in the resources of the state, on whom his friend and

flatterer, Velleius, can lavish no greater praise than by saying that "he almost reduced Germany to the state of a tributary province and penetrated through the country in every direction *without any loss to the army entrusted to him*, the safety of which he above all other generals had at heart."\* It is nothing but spite and ignorance that dictates the unmeaning accusation preserved by the gossip-monger Suetonius (Tib. 52), "that from motives of hostility to Germanicus he depreciated his great exploits as superfluous, and his glorious victories as injurious to the state." We can easily understand and appreciate the delicate position of Tiberius, who, though all the time seeing the real state of things, was obliged to throw a veil over national reverses, and to disguise disasters by bestowing honours and rewards on him who had caused them. Had he at any time been doubtful of the loyalty of Germanicus, and had he feared that his nephew was intent on following in the footsteps of Cæsar, and on laying the foundations of a throne in the conquests of a victorious army, these fears would have been dispelled by the inglorious result of the German campaigns. His solicitude was of a different character; it was that of a prince for the state and people, not that of a usurper for his throne and life. Hence his desire that Germanicus should return, and his regret that he persisted in the same fruitless and dangerous track.

Germanicus' third campaign presents, on the whole, the same features as the second. The same gigantic efforts, the same laborious marches, a pitched battle, which is represented as a great victory, but followed by immediate retreat; the same dangers and losses by land, but a much more awful calamity by sea, which, even in the pages of Tacitus, is apt to fill the reader with horror and pity.

Now at length Germanicus could no longer resist the entreaties of the emperor to return, and to leave the Germans to their internal discords. A splendid triumph, which he was allowed to celebrate in Rome for his German victories, though in reality a farce intended to deceive the people as to the issue of the war, was yet a proof that Tiberius was not afraid of raising his nephew's popularity. That it was, on the contrary, his desire to accomplish this, he showed, by relaxing his usual parsimony, and distributing a large donative to the people in his nephew's name.

#### CHAPTER IV.

THE remainder of the short career of Germanicus is soon told. He received the honourable commission of settling the disturbed state of the East, a commission analogous to that which Agrippa, C. Cæsar, and

\* Vell. Pat. II. 97. Op. ib. II. 116.

Tiberius himself had successively been entrusted with by Augustus. For this purpose he was invested with supreme civil and military authority in all the eastern provinces, and all the provincial governors were subjected to his superior command. He succeeded in placing a king on the throne of Armenia, renewed the alliance with the Parthians, organised Cappadocia and Commagena as Roman provinces, and pacified the discontented parts of Syria. He then visited Egypt, attracted by a laudable curiosity to see this land of mysteries and wonders. Having returned to Syria, he was attacked by a slow disease, and died at Antioch in the 34th year of his age.

The premature death of a hopeful young man, who, if he had chosen, might at any time have become a dangerous rival of Tiberius, was calculated to suggest the blackest suspicions of intrigues, foul play and assassination. Nor were these suspicions confined to the populace alone. The most respectable historians of the subsequent age shared them, and though their statements are confined to surmises, general suspicions, and the loosest evidence, so that they cannot even substantiate the fact of a violent death of Germanicus, yet they have left on the mind of posterity a decided impression that the Emperor Tiberius was not only interested in the death of his nephew, but guilty of it. If this impression were justified, then indeed Tiberius would deserve to be branded as a "detestable and detested monster," and all his military and administrative talent, his care and foresight for the welfare of Italy and the provinces, his economy, his generosity, in short all his public virtues would not suffice to redeem him from the execration of mankind. If on the other hand we shall come to the conclusion that this charge is futile, we shall pause and inquire before we credit all the other charges that are so freely preferred against him.

It seems almost that at Rome it was considered a most natural and necessary thing, a consequence of the birth and station of Germanicus, that he should be dangerous to his uncle, and that the latter must consequently have dreaded and hated him. Nothing seemed able to weaken such an hypothesis, neither the loyalty shown by Germanicus during the mutiny of the Rhenish legions, nor the honours which Tiberius heaped upon him so abundantly. A generation, from which all loyalty and generosity had departed, could not believe in any but the worst motives.

Taking a different view of human nature and of the position of the emperor Tiberius, we are compelled to ascribe different motives to most of his acts, and to purge him from purely malevolent and gratuitous aspersions.

We have already shown that the command of the eight Rhenish legions

could not be left longer in the hands of Germanicus without endangering the safety of the German frontier, and compromising the honour and dignity of the whole empire. In fact Germanicus had been allowed too long to indulge in the hope of military glory, and great losses had been the consequence. His recall had at length become inevitable, and though it was no doubt painful to Germanicus, and gave deadly offence to his proud wife, yet he could not complain of the measure, and still less of the manner in which it was effected by Tiberius. A gorgeous triumph awaited him at Rome, and a most honourable commission in the East. It is not without pain and regret, that we read in Tacitus a remark by which, without committing himself to an open accusation, he suggests the worst suspicions. He says (Ann. II. 5.) "that Tiberius was by no means displeased to see troubles rising in the East, for that he was thus enabled to remove Germanicus from the legions, which were attached to him, to send him into new provinces, and there expose him to intrigue and misfortunes." Surely this is going too far. Intrigue and misfortunes might have done their work in the north as well as in the East. If assassination had been the object of Tiberius, he would have found the assassin as willing, and poison or the dagger as deadly, in Germany as in Syria; if, more cowardly and not less treacherous, he had wished to see Germanicus perish in war, surely warlike Germany offered more chances than the effeminate Eastern nations. It was there that Varus had succumbed with his entire army; Germanicus' own father, Drusus, had there met with a premature death, and Germanicus himself had been more than once in the most imminent danger. It is therefore both ungenerous and illogical to attribute his mission to the East to the insidious motives hinted at by Tacitus.

Simultaneously with the appointment of Germanicus to the supreme command over all the Roman forces and provinces in Asia, Cn. Piso was sent out as governor of Syria, the most important of the eastern possessions of Rome. Piso was a man of haughty and imperious temper, certainly an unamiable and intractable colleague, and no doubt selected for this office to curb and moderate the inordinate passion of Germanicus for military renown, whereby the interests of the empire might be jeopardised. He soon found an opportunity for checking the ardour of the prince. He refused to accede to the request of Germanicus to send the Syrian legions into Armenia, where, as the result showed, they were not wanted, for that country was pacified and received a king from Germanicus without the interference of a military force. Nevertheless Germanicus must have been much offended by the reluctance of Piso to support him in his schemes. The two generals could not possibly remain on good terms, but their differences were fanned

into open hostility by the rancour of their wives. If Germanicus was generous, noble-minded, and gentle, his wife Agrippina supplied those haughtier passions which of a great man make a dangerous one. She looked upon herself as the only true descendent of Augustus. Tiberius in her eyes was an intruder; she hated Livia, and was cordially hated by her in return. Plancina, the wife of Piso, a woman of the same temper, was a favourite of Livia, and it is quite possible that in annoying and humiliating Agrippina in every possible manner, she followed the explicit orders, or at least the secret wishes, of Livia. Yet all that is related of the bickerings and heart-burnings caused by the hostilities of these two women is of such a character as openly to disprove the supposition, freely entertained at the time by the sympathising multitude, that Plancina or Piso were guilty of Germanicus' death. and that in bringing it about they executed the secret injunctions of Tiberius or Livia; for, had the crafty old intriguer really been desirous of encompassing the death of her own grandson, from motives which we fail to discover, would she have been so silly as to select for her agent an avowed enemy of her victim? If poison is employed as the instrument of death it is administered in the loving cup, at the hospitable board, or at the altar with the vows of eternal love and friendship. The hired assassin does not provoke the hostility, but tries to insinuate himself into the confidence of his victim. The just historian will, therefore, pause before he joins in the outcry of the vulgar, who are ever ready to condemn before they have fairly listened to evidence. We shall want satisfactory proof, in the first place, that Germanicus really died of poison; secondly, that this was administered by Piso or Plancina; and, thirdly, that this was done by order of Tiberius.

The case as it stands breaks down at the first stage of our investigation. There is not even any evidence that the death of Germanicus was caused by poison. At the formal trial of Piso and Plancina, which took place before the Roman senate, it was alleged that in the house which Germanicus had occupied there were found, under the floor and hidden in the walls, fragments of human bones, pieces of lead inscribed with the name of Germanicus, and magic formulæ, which the superstitious vulgar of the age invested with supernatural power over life and death. Shall we be satisfied with such evidence as this, which was rejected with deserved scorn even by a tribunal of men not free from a leaning towards similar superstitious practices?

The body of Germanicus was publicly exhibited at Antioch. Suetonius (Cai. I. 1.) avers, that a livid colour spreading over the whole body, and foam flowing from the mouth, indicated that poison was the cause of death. Tacitus, more guarded in his statements, acknowledges that it was not

ascertained if any such indications existed. Supposing, however, the narrative of Suetonius to be correct, it would still be impossible to say what was the cause of the reported phenomena. The credulity of the time, it appears, was prepared to swallow everything, however preposterous. It was stated at the trial of Piso by one of the accusers, that the heart of Germanicus remained untouched by the fire of the funeral pile, and this was a sure proof that he died of poison.

In the absence of all medical evidence that the death of Germanicus resulted from foul play and not from natural causes, we have to inquire into the circumstances attending that death, and more particularly into the conduct of the suspected assassins. L. Piso, as we have seen, was personally opposed to Germanicus. He thwarted and annoyed him on every occasion. Let this conduct be explained, as it generally is, as the result of a secret order of Tiberius, still this supposition entirely fails in explaining his subsequent proceedings, which go far to prove that he acted on his own responsibility, and contrary to the wishes of Tiberius. Being ordered by Germanicus to quit the province of Syria, he delayed his voyage to Italy until he obtained the intelligence of the death of his enemy. He then suddenly returned and attempted to regain possession of the province by force of arms. Failing in this attempt he returned to Rome, where he was put on his trial for the murder of Germanicus, and for the treasonable attempt of levying war against the legal authorities. The trial seems to have been conducted with great impartiality. Tiberius, after the preliminary investigations, brought it before the highest tribunal of the realm, and rigidly abstained from taking any part in it. The charge of murder could not be maintained,\* and seems to have been acknowledged frivolous and unfounded; but the charge of raising civil war assumed so grave an aspect, and Piso saw himself so utterly abandoned by the Emperor to the course of the law, that he anticipated the condemnation which he expected by a voluntary death.

The attitude of Tiberius during this trial was highly dignified. The speech he delivered on the occasion before the senate cannot be read by any one free from prejudice without producing the conviction that his hands were free from blood.† The object of this speech was to

\* Tacit. Annal. II. 13. *Solum veneni crimen visus est diluasse.*

† Tac. Annal. III. 12.—“He told the senators that they would have to try a friend of Augustus, whom, at their recommendation, he had sent to assist Germanicus in settling the affairs of the East. They would have to free their minds from all prejudices, and to decide if he was really guilty of the crime of murder or only of haughty behaviour, hostility towards the young man, and exultation at his death.” “For,” continued he, “if he has neglected his duties as a legate, and set at nought the respect due to his superior commander, and rejoiced in his death and my affliction, I shall hate him and interdict him my house, and I shall not with my public authority revenge my private wrongs. If, however, you discover a crime,



secure a strict investigation and a fair trial. Nor did the conduct of the Emperor belie his words. He kept entirely aloof from the proceedings, and allowed justice to take its course. Had he wished to save Piso, one word, or a hint, or a look would have been sufficient ; had he wished to crush him at once, and with his death to quash all possible evidence of his own guilt, it would have been equally easy for him. He did neither the one nor the other. He trusted that a fair and open trial would establish the truth, and clear him also of the slanders which he knew to be in circulation, but which he thought it beneath him to notice.

I am afraid I have dwelt too long on this subject, but I deemed it necessary to exhibit, in one glaring example, the injustice with which Tiberius had been treated by his contemporaries and by history. We shall henceforward be able to occupy higher ground, to form our own opinion of his motives, his character, words and actions, without paying too much deference to the impressions of his contemporaries, whose spite and antipathy has imparted a false colouring to Tacitus and other early writers. We shall of course have to go to these same sources to draw our facts, but the judgment we reserve to ourselves.

## CHAPTER V.

THE death of Germanicus deprived Tiberius of a strong support, and the new form of government of much of its prospect of continuance. Tiberius, like Augustus, was anxious to gather round him members of his own family, to gain for his house and government that stability which is secured in modern Europe by a long continuance of hereditary succession. It is the most natural and necessary precaution which the which even in the case of the lowest citizen calls for punishment, then give just consolation to the children of Germany, and to me—his parent. Consider this point also, if in his relations to the troops, Piso showed a neglect of discipline, a spirit of insubordination, and a desire to gain the favour of the soldiers by popularity ; if he attempted to regain his province by force of arms, or if these charges are false or exaggerated by his accusers, whom I justly blame for their excess of zeal. For what end could it serve to expose the body of Germanicus, naked, to the eyes of the populace, and to spread a report even among foreign nations that he was poisoned, if even now this fact is doubtful and has to be inquired into. I mourn for my son, and shall always mourn for him, but I would not prevent the accused from producing all the evidence he can to prove his innocence ; or, if Germanicus was guilty of unfair treatment of him, to show it ; and I entreat you not to consider imputed crimes as proved, because this trial is painful to my feelings. Let those who, on account of their relationship or attachment, defend the accused, strain every nerve to assist him in his peril with their eloquence and zeal ; the same activity and the same perseverance I enjoin on the accusers. One privilege only I will grant to Germanicus, that this case shall be tried not before the regular judges in the forum, but in the curia by the senate. In every other respect the common procedure shall be adhered to. Let nobody pay any attention to the tears of Drusus, nor to my own grief, nor to idle gossip directed against me."

founder of a new dynasty and government can take, to look to his own kinsmen for support, and to train them up to political power. For such considerations as these, Napoleon I. bore the shortcomings and even the antipathy of his brothers, and conferred kingdoms on his erratic brother-in-law and on his devoted stepson. Tiberius knew perfectly well that he himself had nothing to fear. He held the reins of government with too firm a grasp. He despised his Roman aristocracy too much to dread them; but to prevent the repetition of the dreadful civil wars, and to secure the continuance of a form of government which for Rome had become an inevitable necessity, he wanted younger men than himself, endowed with capacity and firmness. It is very probable that he thought he had found such a one in his nephew Germanicus, and his temper was such, that in all probability he would have preferred him as a successor to his own son, if he had had a chance. For the latter he does not seem to have had much paternal affection, partly because he was not blessed with a heart to love tenderly, partly because Drusus showed a coarseness of taste, a hastiness and violence of temper, which were calculated to disgust Tiberius and to inspire the gravest apprehensions for the future. So far, therefore, from adopting the opinion that Tiberius was afraid of his nephew, and desired his death, I am convinced that he felt his loss as a severe blow, and lamented it sincerely. It is true he did not show his grief by those outward marks of sorrow, which are generally accepted as the measure of the feelings of the heart: he abstained from participating in the funeral pomp, and he purposely shortened the days of public mourning. But he was naturally averse to all exhibitions of feeling, and who would charge him with indifference at the loss of his nephew, when he preserved the same moderation in his grief at the death of his own and only son.

Deprived of the assistance and support of a near relative of considerable abilities and great promise, and finding his own son Drusus deficient in the essential qualities of a ruler, Tiberius allied himself more and more with a man, whose revolting depravity, artfully concealed under the deceitful exterior of moderation, virtue, zeal, and devoted attachment to the imperial house, became a dire curse to that house and to the whole community (*Tac. Annal. IV. 1.*) This was L. Aelius Sejanus, a man of great ability as a politician and a soldier; endowed with boundless ambition, a courage that shrank from no danger, and a body capable of enduring the greatest fatigue and hardship. Tiberius found him, at his accession, in an office of high importance, as commander of the Prætorian guards, and he entrusted him with a most delicate and difficult mission, in sending him as a companion and adviser with his son Drusus, to quell the mutiny of the Pannonian legions. He

fondly hoped to have found in him an Agrippa, and he was prepared to follow the example of Augustus, and to secure the attachment and fidelity of his servant by allying him to the imperial family. He accordingly betrothed a daughter of Sejanus to a prince of his house, a son of Claudius, the brother of Germanicus. But he was grievously mistaken if he thought that this distinction was sufficient to satisfy the ambition of Sejanus. That bold and bad man contemplated from the very beginning not less than the extermination of the whole house of the Cæsars, and the assumption of the imperial purple. How he succeeded in totally deceiving the watchful Tiberius, and in carrying out his sanguinary schemes to within a very short distance of their realization, is one of the most extraordinary phenomena of that extraordinary time. Tiberius seems to have been supernaturally infatuated with him. He who confided in no one else, had unbounded confidence in this prince of hypocrites and traitors. We should not be surprised if this hallucination was the result of the emperor's superstition, and if he thought that his favourite astrology revealed to him in Sejanus his truest friend. He might indeed be pardoned, if he fancied to see this conviction supernaturally confirmed by an event that took place on one of his excursions into Campania, when a grotto, in which the imperial party happened to be at supper, fell in, and Tiberius was protected from the falling rocks by the presence of mind and the devotion of Sejanus, who shielded and saved him with his own body.

The first crime of Sejanus exposes to our view such a sink of corruption, profligacy, and turpitude, that it is not easy to familiarize ourselves with the idea of its mere possibility. Drusus, the emperor's son, was the first and chief impediment which Sejanus had to encounter in his tortuous way to the throne. He had, therefore, to be removed. He was married to Livilla, a sister of Germanicus. This abject woman, an imperial princess, the consort of the heir apparent, and mother of several children, stooped to the infamy of an adulterous intercourse with Sejanus, and with her paramour plotted the murder of her unsuspecting husband. So secretly and skilfully did the conspirators execute this deed of blood that not the shadow of a suspicion was roused, and that it was not revealed to the disgust and horror of the world till eight years afterwards, by the dying confession of *Apicata*, the injured wife, whom Sejanus had divorced to gratify the profligate Livilla, and to be able to marry her after the murder of Drusus. For this last step, however, he required the sanction of Tiberius. Sejanus had the hardihood to apply to the Emperor for the hand of the widow of his victim. He was refused this mark of favour, but the refusal was couched in such gracious terms that it was evident the Emperor

was not offended and afraid to offend. It appears that Sejanus was afterwards betrothed to a daughter of the man he had murdered and of the woman he had debauched. The consummation of this revolting union, however, was prevented by the awful catastrophe, in which Sejanus perished.

We are compelled, very much against our inclination, to follow the infamous Sejanus in his atrocious progress of hypocrisy and murder. The principal obstacle in his way to the throne was removed by the assassination of Drusus. He was the only prince of the imperial house in the full vigour of manhood, but the three sons of Germanicus might become formidable rivals in a short time. Their ruin therefore was Sejanus' next task, and it was facilitated by the imprudence of two of the young men, and by the overbearing spirit of their mother, Agrippina. In most respects Agrippina was the model of a true Roman matrona; her chastity was unimpugned in a period of the most disgusting profligacy, from which even imperial princesses were not exempt; her high and noble spirit, her courage and energy were conspicuous in the camps and armies to which she accompanied her consort; but her pride was fully equal to her vigour. She looked upon herself and her children as the only true descendents of Augustus, and upon Tiberius as an intruder. In vain did Germanicus on his death-bed implore her to moderate her pride, and not, by her rivalry, to irritate those more powerful than herself. In sullen pomp she returned to Rome, keeping aloof from the imperial house and nursing especially her ancient hostility to Livia, upon whom she looked as the first and chief source of all the misfortunes that had befallen the house of Augustus. She had her own friends and her own party, a kind of opposition to Tiberius and Livia, powerless it is true for good or evil, but still galling to the Emperor as an indication of her disposition, and in case of sudden complications dangerous in the extreme. It is no matter of surprise that Sejanus, who had the emperor's confidence, easily succeeded in widening this breach. His whispered insinuations, his stratagems, his lies, blew the spark of aversion and difference into a flame of rancour and open hostility which could be quenched only in blood. His tactics were diabolically skilful. He singled out for his first attacks the intimate friends of Agrippina, against whom he brought charges of high treason or other political offences, which were sure to draw upon them the unmitigated hostility of Tiberius, and could not fail to implicate Agrippina more or less. Unfortunately for her, the moral purity of her friends stood not higher than the general low level common to the age. Among them was Claudia Pulchra, Agrippina's cousin and intimate friend, who was accused of immoral conduct, adultery, and the attempt of poisoning

Tiberius. There seems to have been sufficient ground for at least some of these charges, and Claudia was found guilty. Upon this Agrippina, in the greatest excitement and passion, rushed into the presence of the emperor, whom she upbraided in the most violent language with hostility to the true descendents of Augustus, arguing that the condemnation of Claudia was merely a blow aimed at herself. Tiberius, with his usual coolness, showed no signs of anger, but contented himself with calmly saying, in the words of a Greek poet, "My daughter, do you consider yourself harshly treated if you are not allowed to reign?"

It might appear that the hostility between the Emperor and Agrippina had proceeded far enough to produce the result desired by Sejanus; but the latter had in store still more powerful engines to consummate his designs. By his emissaries he warned her to avoid the hospitality of Tiberius, suggesting that he intended to poison her. The proud Agrippina could not brook to be suspected of fear. She purposely appeared at the imperial table. Her suspicions had in the mean time been communicated to Tiberius, who, to test the truth of the report, offered her some fruit with his own hand. Upon her refusal to taste it, he felt stung to the quick, and in unequivocal terms declared his resentment.

Whatever was the extent of distrust and aversion existing between Tiberius and Agrippina, it is evident that the former extended his affection for Germanicus to his and Agrippina's children. At the Emperor's request, his son Drusus had adopted them, and he likewise continued to them the same feelings of love and kindness which had so nobly distinguished his intercourse with Germanicus. After the untimely death of Drusus, which Tiberius bore with dignified resignation, and the manliness of a great prince, his affection seems to have been revived for the young men who were a second time bereaved of a parent and protector. In the increasing desolation of his house, he saw in them the frail hope of that stability of his dynasty and of the new order of things, which he naturally had much at heart: but though as yet he could not suspect the awful crime to which Drusus had succumbed, he dreaded the unseen minister of death that was evidently hovering round the members of the Augustan house. Taking his two eldest grand-nephews, Nero and Drusus, by the hand, he implored the senate to love them and protect them as fathers. He then clearly designated them as his successors, being evidently more anxious to secure, in case of his decease, the stability and peace of the state than the succession of his own grandchildren.

What a different picture presents itself a few years later. We find Tiberius urging the senate to inflict condign punishment upon Nero, whom he charges with unnatural profligacy. The unfortunate prince

is banished to the Island of Pontia. Drusus is likewise accused before the senate, and declared an enemy of his country. His long imprisonment in a dungeon of the imperial palace, his mad ravings of revenge and despair, registered day after day by appointed watchers, and after his horrible death by starvation, recited in the senate by order of Tiberius, form one of the most gloomy and revolting pictures of that wretched age. To what extent these two youths were guilty we cannot now presume to decide. The narrative of Tacitus is here interrupted by a great blank. No doubt Sejanus had his hand in exaggerating and perhaps prompting the offences they committed. There can be no doubt, however, that Tiberius considered them guilty, and in punishing them felt not less afflicted than Augustus did in banishing his profligate daughter Julia, and his riotous grandson Agrippa Posthumus. Surely Tiberius deserves our commiseration and not our censure. In punishing the offences of his grand-nephews he could have no sinister motives, for there can be no doubt that he at one time loved them and wished to secure them the right of succession. He continued his favour uninterruptedly to their brother Caius, who, unfortunately for Rome, became his successor, and by his follies and crimes has contributed as much as his infamous sister Agrippina to cause us to suspect the virtue of the children of Germanicus.

## CHAPTER VI.

IN the twelfth year of his reign Tiberius left Rome never to return. Delaying for a while on the smiling coast of Campania, he finally selected the small island of Capræ for his permanent abode. Here he lived in strict seclusion for the rest of his reign, surrounded only by a few trusted friends, among whom Sejanus unfortunately still held the most prominent position. What was the cause of this retirement was a matter of doubt and speculation even in antiquity. The malevolent spirit so actively at work to suggest the worst motives for all his actions has put several constructions upon this step, all alike condemnatory. The most futile charge is that preferred by the uncritical Suetonius, that the Emperor had at last resolved to give himself up to sloth and idleness. He did not know the nature of that imperious spirit who could entertain such a supposition. It is, moreover, sufficiently established by satisfactory evidence that Tiberius never ceased to take an active interest and share in the government, that he remained in constant communication with Rome, and decided the most important matters himself almost to the very last day of his life. His active mind, accustomed and able to rule mankind, could never subside in indifference or sloth.

Not less unfounded is the supposition, indulged in by others, that the Emperor courted solitude in order to hide the growing infirmities of his old age: his bent stature, bald head, and the ugly blotches of his face. Nothing could be farther removed from the temper of that haughty Claudius than such weakness, which would have reduced him to the level of a fop, and even in a woman would have been disgraceful.

But far worse suspicions than these have found more general credence. It was whispered that the lowest of carnal appetites, a desire to indulge without restraint in the vilest lusts and unnatural voluptuousness, urged him to shun the eye of the capital, and prompted him to establish in the pleasant retreat at Capreæ a hell of sensuality. The pen of a modern historian recoils from the very names of the disgusting practices which the prurient gossip-mongers of that immoral age did not hesitate to ascribe to a man who had almost reached the extreme limit of human existence, and who had been so conspicuous in his youth and manhood for temperance, frugality, and purity of life that even the malice of anonymous slanderers could not invent wherewith to reproach him. We may well ask what could have prevented him, if he had been so inclined, from satiating the lowest appetites in the secret recesses of his imperial palace at Rome. Was he more likely to escape detection in the lonely island? Would not the ministers of his lusts surround him there also? And why should he dread obloquy for sensuality which had so infected the social body that it almost ceased to be a reproach? He who so utterly despised the public opinion of his contemporaries would have set them at defiance and rejoiced in doing so; if his failings had been those ascribed to him.\* He almost courted the reproach of the servile crowd that cringed round the feet of his slaves; but he was scrupulously jealous of the verdict of posterity, and he was too far-sighted to hope that he would be able at the same time to secure an unsullied fame by throwing a veil over misdeeds that will and must rise to greater proportions through the very mist intended to shroud them.

If this scandalous accusation were founded we should hardly expect to find among the companions of Tiberius at Capreæ a regular staff of philosophers, rhetors, learned lawyers, and poets; men whose presence would naturally lead us to ascribe to Tiberius a very different sort of life from that of an abandoned voluptuary. The Emperor had had a liberal education; he was well acquainted with the language and literature of Greece, and delighted in the study of the immortal works of

\* When Fulcinius Trio, one of the vilest wretches of his time, was at length brought to justice, and, before committing suicide in prison, had composed a document in which he covered Tiberius with charges and invectives, the Emperor caused the paper to be read in the senate. Tac. Ann. VI. 88.

that gifted nation. During his residence in Rhodes he had regularly attended the classes of the philosophers and rhetoricians ; and he was always surrounded by some of the most distinguished literary men of his time. Nor was he meanly versed in the literature of his own country. He took a pride in speaking and writing Latin with perfect purity. But he was more especially devoted to the study of astronomy and astrology, and this latter aberration of human ingenuity, which other great men have since shared with him, had considerable influence over his actions, an influence which, from its very nature, can never be sufficiently appreciated. Summing up, therefore, all these considerations, his unwearied political activity, his literary tastes and relaxations, his former continence and temperance, and his old age, we shall come to the conclusion that we should be wrong in crediting the foul aspersions of the disaffected aristocracy and the tavern gossip of the vulgar, without more trustworthy evidence than the vague reports which have so long satisfied the credulity of ages.

## CHAPTER VII.

EVERY successive phase in the life of Tiberius was, according to Tacitus, a descent from a higher to a lower level of morality ; his natural tendency was downwards, every step he took was in that one fatal direction ; every friend, real or pretended, that he lost, took away a portion of the artificial buoyancy which had kept him from sinking to the lowest slime of the pool of iniquity. His life is like a dismal tragedy marked off into five acts by Tacitus. Up to the death of Augustus he is allowed to have been a man of excellent life and character ; as long as Germanicus and his son Drusus lived he assumed at least the appearance of virtue ; during the lifetime of his mother he showed a mixture of good and bad qualities ; the fourth period of this dismal progress is given as that of the paramount influence of Sejanus, whom Tiberius loved and feared ; it is marked by cruelty, but as yet a decent exterior is thrown over his lusts. When at length that last good genius is removed from the side of the luckless Tiberius, three years before his death, in his 74th year, he is for the first time in his life free from all restraint, from all fear, all shame, all considerations, able at length to satisfy to his heart's content his long restrained appetite for blood and the filthiest debauchery. Tac. *Annal.* II. 51.

This is the sort of rhetorical tirades that Tacitus delights in. It produces effect, rouses indignation, secures sympathy, and that is a primary object with that tragic historian. We shall attempt to be more cool and prosaic in our generalisations, and as we have already



shown that the charges directed against the earlier life of Tiberius are to a great extent futile, we shall have no difficulty in proving the same of the last and most melancholy period.

The long and extraordinary success of Sejanus had raised him to an eminence on which it was impossible to stop, and from which he could descend only by a sudden and crushing fall. He had long possessed the unlimited confidence of Tiberius. He rose higher after every deadly blow aimed at the house of his master. During Tiberius' sojourn at Capræ he was *de facto* the master of the Roman world. He seemed to be within reach of the great prize, for which he had been working all his life. But the old man was not so reckless of what was going on around him, nor so absorbed in sensual enjoyment as we are desired to believe; his eyes were opened on the doings of his favourite, and from that hour that favourite was lost.

This is not the place to detail the events that accompanied the fall of Sejanus. We have to investigate only one point: if, in the reaction that followed, Tiberius indulged a passion for innocent blood and extended his victory beyond the limits prescribed by justice, fair retribution, and a due consideration for his own safety and that of the state.

In the first place we must not forget that Sejanus was guilty of a conspiracy of the most dangerous kind. He was the commander of the most formidable body of troops in Italy, the dreaded Prætorian guards, devoted to him *without* reserve, and commanded by officers of his own choice. He had for a long time been the exclusive channel of imperial favours; his nominees filled every important and lucrative office. In the immediate company of the Emperor at Capræ he had his spies and trusty adherents, some of them chosen from among the oldest and most intimate friends of Tiberius. Proportionate to the extent and subtlety of these ramifications was the difficulty of distinguishing innocence and guilt, and even the most unbiassed tribunal would have been unable, in its calmest deliberations, to dispense justice with an unerring hand. But after a political storm the equilibrium of the balance of justice is disturbed, and a fatal momentum is given to the scale of the victorious party. This has been the case in modern history and in tribunals where at least all the forms of justice were preserved. What can we expect from bloody sessions in the time of Tiberius, when the memory was fresh of the wholesale slaughters and the iniquitous proscriptions of the triumvirs? I do not now speak of the first ebullition of the long pent-up rage of the Roman people against Sejanus and his party. In those horrid acts of revenge even the forms of justice were disregarded, though the hangman did not forget to execute on the innocent little daughter of Sejanus the brutal law of ancient Rome,

which did not permit virgins to be put to death. When the populace is turned into executioners the limits of guilt and innocence are hopelessly confounded, and the stern spirit of antiquity involved too readily in one guilt and one punishment all the kindred and friends of the object of their revenge. For this wholesale butchery therefore Tiberius has not been held responsible, but for the continuance of prosecutions for several years, when the imminent danger from Sejanus and his party was past, and revenge might have been supposed to have had her fill. Dio, always credulous in his estimates and reckless in his statements, says "that none of the accused were acquitted, but that they were all put to death without exception." (Dio, 58, 24.) Tacitus, though less sweeping in his condemnation of Tiberius, is yet severe enough, and his judgment would have to stand unaltered, if his faithful representation of details did not furnish us with the materials for considerably mitigating his final sentence.

It appears then that in the investigation of the cases arising out of the conspiracy of Sejanus, Tiberius was anxious that the highest tribunal of the state, the senate, should exonerate him from annoyance and odium. No doubt he knew that that august body would not err on the side of leniency. His influence had most frequently to be exerted to moderate the unbecoming zeal and the intemperate severity of the Fathers. He was disgusted with the protracted trials and executions. Of his feelings at this time we have a pretty certain indication in a letter which he wrote to the senate, and in which he said: "If I know what to write to you, Conscript Fathers, or how to write, or what not to write at this time, then may all the gods confound me still worse, than I feel myself daily perish." These are not the words of a man enjoying all his natural propensities to the full. It is a proof of the deep melancholy which had settled in the Emperor's mind, a melancholy easily accounted for from the misfortunes of his own family and the hopeless wretchedness of the times.

A proof that the Emperor was not devoid of generosity or justice even in this gloomy period, is furnished by the trial of a Marcus Terentius, a Roman knight, accused of having been a friend of Sejanus. This man, instead of denying the fact, boldly avowed it in a manly speech, thus preserved by Tacitus: *Annal.* VI. 8.—"Perhaps it is less expedient for me to confess this crime, than to deny it; but, whatever may be the consequences, I shall confess that I was a friend of Sejanus, that I desired to be one, and that when I had obtained his friendship I rejoiced in it. I saw that he was the colleague of his father in the command of the Prætorian cohorts, that soon after he had authority in civil and military matters; his relations and kinsmen were raised to

honours ; in proportion as any one was intimate with Sejanus had he access to the friendship of the Emperor : those, on the other hand, to whom he showed hostility, were exposed to fear and persecution. I will mention no names ; but in my own case I shall defend all those who had no share in his last schemes. For it was not simply Sejanus of Vulsinii whom we acknowledged as our patron, but a member of the Claudian and Julian house into which he had married, thy own son-in-law, o Cæsar, the companion in thy consulship, who discharged thy duties in the state. It is not for us to judge, whom thou raisest above others, and for what reasons. To thee the gods have given supreme authority, nothing is left to us but the credit of obedience. Moreover, we look at that only which is open and apparent, who receives from thee wealth and honours, who has the greatest power to do us good or evil. Who does not know that this was the case with Sejanus ? To penetrate into the secret thoughts of the Prince and into his private counsels is unlawful and dangerous ; nor is it possible withal. Do not bear in mind only the last day of Sejanus, o Conscript Fathers, but the last sixteen years. We used to respect even Satrius and Pomponius ; it was considered a splendid success to be noticed by his freedmen and doorkeepers. What then follows ? Is this defence general and applicable to all cases ? Certainly not ; but let a just distinction be drawn ; let treason against the state, and plans against the life of the Emperor be punished ; but as far as friendship and friendly offices are concerned, the same motive will acquit thee, o Cæsar, and us." The result of such boldness was the acquittal of Terentius and the condemnation of his accusers. A direct interference of Tiberius in favour of an intended victim took place in the trial of Cotta Messalinus. (Tac. Ann. VI. 5.) who was charged with irreverent language regarding the Emperor. Tiberius requested that a few unguarded words which had escaped a man in a convivial hour should not be imputed to him as a crime. Similar leniency he showed in a case in which five of the most distinguished men were implicated. Two of them were saved by their counsel, the trial of the other three was postponed, at the request of Tiberius, until he should be present at Rome, which he never intended to be.

These cases are sufficient to show that no brutal blood-thirstiness animated Tiberius to an indiscriminate slaughter. If there were many cases of conviction and capital punishment, we may be sure that most, if not all of them, were richly deserved. In some cases we are able to show this ; in others our imperfect knowledge of detail prevents us from forming an opinion. But our esteem for the impartiality of Tacitus is much shaken when we find him lavish his rhetorical sympathy on such wretches as Fulcinus Trio, and Paconianus. (Tac. Ann. VI. 38, 39.)

Tardy but just retribution overtook also Aemilia Lepida, wife of the unfortunate Drusus, the son of Germanicus. She also had been guilty of adultery with Sejanus, and instrumental to the ruin of her husband. She was now convicted of intimacy with a slave, and anticipated the executioner by her own hand. (Tac. Ann. VI. 40.)

The judicial forms so carefully adhered to in the cases of all the persons accused of participation in the conspiracy of Sejanus, are strangely at variance with what is reported to have taken place in the year 33. Tacitus relates that Tiberius issued an order, that all persons then in custody on the above charge, should indiscriminately be put to death. He then draws a dreadful picture. He speaks of an endless slaughter of every sex and age, of corpses of men of rank and of low birth here dispersed, there heaped upon one another. But that this was a great exaggeration is apparent from Suetonius (Tib. 61), who says that twenty were put to death in one day.

Whatever may have been the truth as to the number of victims, it seems that the Emperor's motive was to have done once for all with these bloody scenes, and for this reason he ordered also the most active and infamous of the informers to be executed. But the heads of the horrid hydra grew again, and Tiberius could not stem the torrent of blood.

*(To be continued.)*

## TENTH ORDINARY MEETING.

ROYAL INSTITUTION, March 3rd, 1856.

ROBERT M'ANDREW, Esq., F.R.S., PRESIDENT, in the Chair.

The resignation of Mr. John Forshaw was received.

Mr. T. C. Archer illustrated the formation of pearl, by specimens; Mr. M'Andrew exhibited several ancient medals, and Dr. Thomson noticed the fall of very fine snow crystals upon the 20th ult.

The paper for the evening was—

### ON THE USEFUL PRODUCTS OF THE NATURAL ORDER GRAMINACEÆ.

By T. C. ARCHER, Esq.

Few persons unaccustomed to reflect upon the sources of those materials which form the necessaries or luxuries of mankind can form even

an approximate idea of the remarkable distribution, through the vegetable kingdom, of those plants which yield useful products. Botanists have divided the known species of plants into rather more than 300 Natural Orders, containing about 9,000 genera, and probably 100,000, certainly over 90,000, species; yet of all this vast number it is surprising how few comparatively have yet been found to afford any useful products, and these are restricted to a very few of the great natural groups.

The order now under consideration is probably the most remarkable of all for the large number of its useful species, and their very great importance to the human family generally, as well as to a very large portion of the Animal Kingdom. I do not intend to refer specially to those grasses which clothe the earth with that verdure which constitutes one of its most glorious ornaments, and at the same time yield the essential food of the animals most useful to man, and to innumerable others whose indirect action is perhaps no less essential; nor do I intend to make any particular mention of those cereals which are in common use in our own houses. My object is rather to bring before you some facts in the history of those graminaceous plants which are less generally known, or about which I hope to be able to raise some new interest.

The pasture grasses are numerous, and I shall say but few words upon them. The most valuable are *Festuca ovina* (L.), or the sheep's fescue grass, which is frequent on calcareous soils, and is said to occasion the delicate flavour of down-fed mutton, and is one of the grasses carefully selected for ornamental lawns. *Festuca pratensis* (E. B.), various species of *Poa*, the dogs'-tail grass, *Cynosurus cristatus* (L.); two or three species of *Lolium*, especially *L. Italicum*, the Italian Rye-grass; the *Phleums* or cats'-tail grasses, and *Alopecurus* or fox-tail grass. The beautiful odour of new mown hay is owing to the mixture of *Anthoxanthum odoratum*, (L.) which has the property of secreting Benzoic acid, in common with several other species of *Graminaceae*.

These pasture grasses thrive best in the northern parts of the temperate zone, but other climates are not devoid of similar useful products. The prairies of North America wave with vast crops of coarse grasses, yielding abundant food to the wild cattle and other beasts. The Savannahs of the south produce grasses valuable as fodder, and remarkable for their gigantic size, the most common species is *Panicum spectabile* which resembles the reed in size, being often more than six feet in height. In the jungles of India we find the coarse *Cynodon dactylon* (Persoon). The Falkland Islands yield the celebrated tussac grass, and in New Holland we find a most excellent fodder in the kangaroo grass, *Anthistiria Australis* (Robert Brown).

A species of *Glyceria*, *G. Fluitans* (R. Br.), not only yields a valuable fodder for cattle, but a very nutritious and highly palatable grain, which is collected for food in Russia. This plant is a native of Britain, and is found abundantly in shallow stagnant waters and slowly running streams; although a most abundant bearer the seeds are never collected in this country, but in Russia the collection of the seeds is an important branch of industry; the mode of obtaining this grain is curious: the peasant takes an old felt-hat, and, wading in the water, skims the hat amongst the patches of *glyceria*: when the grain is ripe, the seeds fall into the hat, and in this manner are saved. I do not know the process used by the Russians for husking this grain, but they accomplish it very completely, and generally granulate it, in which state it resembles *Semolina*, and it is called *Manna* or *Manna croup*. Most of the vessels from the Russian Baltic ports bring small quantities, generally as presents, belonging to the captains: it is quite equal to the Indian Soojee, or the Italian Semolina. It is occasionally imported in another form, called *gritz*; in this state it is simply the fruit, or caryopsis, denuded of its covering. In both forms it is an excellent diet article, especially for children.

Another genus yields several species which are important as furnishing a large supply of human food, besides other interesting and useful products. *Sorghum vulgare*, (W.) or the Great Indian millet, is identical with the durra of the Turks and Arabs—the negro corn of Africa, and the broom corn of North America; it is largely cultivated in the United States and the West Indies as food for the black population, and the branching wiry stems of the panicle are used for whisks and carpet-brooms; another species, probably *S. nigrum*, (R. & S.) furnishes a grain food for the Malays and Javanese. *Sorghum saccharatum* has lately been proposed as a source for sugar, but with no great prospect of success. An allied genus, *Andropogon*, is very remarkable for the number of highly odorous plants which it yields—thus the celebrated *vetiver*, or kus-kus of the Orientals, is the root of *A. muricatus* (Retzius,) the *Anatherum muricatum*, (Beauvois); its aromatic property is more strongly developed when the root is moistened; it is manufactured into mats, fans, baskets, &c. Several of the *Andropogons* yield sweet-scented essential oils, thus *A. ivarancusa* yields the roosa oil of India, used as a rubefacient in rheumatism by the native practitioners, and in Europe as a perfume under the name of oil of rose-scented geranium. *A. schenanthus* (L.) yields in Ceylon the beautiful lemon grass oil, or oil of verbena as it is sometimes called, from its resemblance to the *Aloysia citri-odora* or sweet-scented verbena, and *A. citratum* yields the other lemon grass oil called *Citronelle*.

We are apt in this country to think that wheat is the most extensively used of all the *Cerealia*—this is not the case—the number of human beings who feed upon rice is far greater, and its astringent qualities render it far superior as a food in tropical climates. I exhibit a curious preparation of this grain, much used in India as an accessory to the desert; it is prepared in a manner exactly similar to the pop-corn of the Americans—that is, by soaking the grain and then throwing it on a plate of iron placed over a fire, the grain submitted to this process explodes by the expansion of the steam within, and turns inside-out.

It is not generally known that efforts have been made to grow rice in England, and a crop was actually gathered near Windsor some years since: it is however too tender for our climate.

In India, Africa, and Southern Europe several species of millet are used, as *Setaria itaica*, *S. germanica*, *Panicum frumentaceum*, *P. pilosum*, *Penicillaria spicata*, the seeds of which are made into various kinds of food as a cheap substitute for rice.

The natcheny of the Coromandel Coast and Japan is not a true millet, but is the seed of *Eleusinia coracana*, said to be a useful cereal.

The canary-grass seed resembles millet somewhat; it is yielded by *Phalaris canariensis*, which is extensively grown in Germany and also in England about Margate, Ramsgate, and Canterbury.

The water rice of Canada, *Zizania aquatica*, is said to be an excellent eatable grain, but has never been much cultivated, probably from its aquatic habit.

There are other valuable applications, for instance, the stem or culm of *Arundo donax* forms the most admirable arrow shaft for the Indian, who would otherwise experience much difficulty with his rude implements in making one so straight and light from any other material. The stems of *Arundinaria schomburgkii*, which are imported into Liverpool under the name of reed-canes, for the manufacture of shuttles and fishing-line winders, are also used by some of the South American Indian tribes as blow-pipes from which to expel their small poisoned arrows.

The common reed, *Phragmites Arundinacea*, is very valuable as a thatching material in Europe, and the stoloniferous habit of *Arundo arenaria* and some others is of great service in binding the sands of such shores as those of Lancashire and Cheshire, and thereby protecting them from the influence of the wind. The sand dunes of Southport and New Brighton are held together by this means. In Spain two or three species of grass are employed in making ropes for common purposes; thus *Stipa tenacissima* and *Spartina stricta* are commonly employed for that purpose.

The curious seeds of *Coix lachryma*, or Job's tears, are occasionally used in medicine, as a diuretic, in the West Indies.

But one of the most useful of all the genera of *Graminaceæ* is that of *Bambusa*, whose lofty hollow stems, the common bamboo canes, are used for an infinite variety of purposes by the ingenious Chinese and East Indians. The facility with which these hard wooded culms split gives great scope to their useful applications, and the large size of their internodes admits of many useful articles being formed from them. They are used in building and furniture making, in the lightly built Chinese dwellings; they form admirable fences, and cut up for a vast number of different uses. The one I exhibit is a spill-holder of considerable diameter. Several smaller species form walking canes, and the young shoots of all are pickled or preserved in sugar as a succade. A curious product called *Tabasheer*, supposed to have peculiar prophylactic virtues, is secreted in the nodes; it consists only of flint, which mineral is secreted by most of the *Graminaceæ*, and is generally deposited on the stems in the form of a glossy varnish, as in the straw of wheat and other cereals.

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## ELEVENTH ORDINARY MEETING.

ROYAL INSTITUTION, March 31st, 1856.

WILLIAM IHNE, Esq., Ph.D., VICE-PRESIDENT, in the Chair.

The following gentlemen were elected Ordinary Members:—Mr. John Grainger, B.A., and Mr. John Towne Danson, F.S.S.

The paper for the evening was

UPON THE EXTRAORDINARY AND ABRUPT CHANGES OF FORTUNE OF JASPER, EARL OF PEMBROKE, (AFTERWARDS DUKE OF BEDFORD) IN THE FIFTEENTH CENTURY.

By RICHARD BROOKE, Esq., F.S.A.

JASPER TUDOR, Earl of Pembroke, often called Jasper of Hatfield, from the place of his birth, was a nobleman celebrated for his descent, and for the royal and illustrious alliances of his family. He was one of the noble personages who lived and distinguished himself in the fifteenth century, a period memorable in the history of England for foreign and domestic wars and civil dissensions, and for the strange mutations of fortune, which its princes and nobles were doomed to



experience; and, perhaps, we may search the pages of history, in fruitless endeavours to discover an instance of any nobleman, who experienced such abrupt and extraordinary vicissitudes, and such sudden and astonishing transitions, on several occasions, from power and wealth to exile and poverty, and from the miseries of a poor outlaw and fugitive to rank, possessions, and honours, as fell to the lot of Jasper, Earl of Pembroke.

It matters now little to us, whether, in the wars of York and Lancaster, and the violence and exasperation of the contending factions, the one party or the other was in the right, but under every possible circumstance, whether the cause which he espoused was successful or unfortunate, he uniformly supported the Lancastrian interest; and when we consider how many personages of high rank fought, during those lamentable conflicts, sometimes on one side and sometimes on the other, and joined the winning party as seemed best to suit their own interests, we must at least give him credit for consistency, and perhaps for sincerity. One reason of some moment may however be found for his strenuous and consistent support of the Lancastrian party. He was half-brother of King Henry VI., being the son of Sir Owen Tudor,\* who was descended from persons of the first consideration, and of a family of great antiquity in Wales, by his wife, Queen Katherine, daughter of Charles VI. King of France, and widow of Henry V. King of England, and he had by Queen Katherine two sons, the oldest of whom was Edmund, Earl of Richmond, usually denominated Edmund of Hadham, who married Margaret, daughter of John Beaufort, Duke of Somerset, the son of John, Earl of Somerset, a son of John of Gaunt, Duke of Lancaster, fourth son of Edward III., by whom he had a son, Henry, Earl of Richmond, who was afterwards King Henry VII.; and the second son of Sir Owen Tudor was Jasper Tudor, who was, in consequence of his father's marriage with Queen Katherine, uncle of King Henry VII. He was also, through his mother, immediately descended from the kings of France, she being the daughter of King Charles VI. [See Pedigree.]

King Henry VI. created Jasper, Earl of Pembroke, and, in consequence of his recovering the Castle of Denbigh and other strongholds in Wales out of the hands of the adversaries of Henry, he obtained a grant of 1000 marks, payable out of the lordships of Denbigh and Radnor.

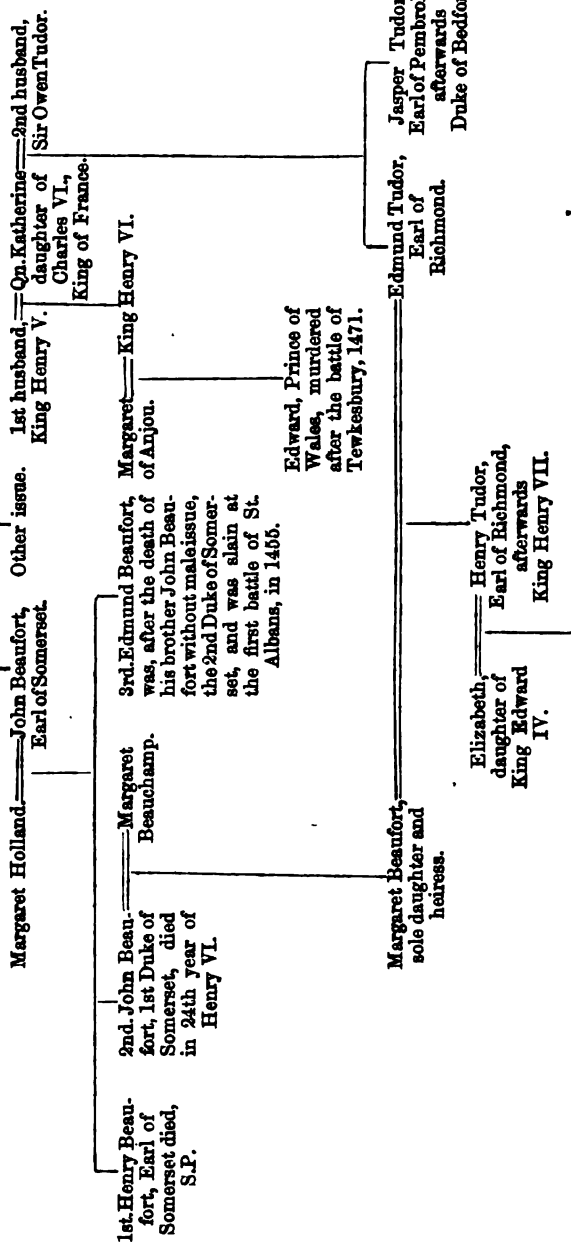
The Earl of Pembroke appeared in 1460-1 in arms, with James

\* He is called Sir Owen Tudor by Hall, Holinshed, Speed, Grafton, and Sandford, (and the latter does not always call him so); but only Owen Tudor by Baker, and by Leland in his Collectanea and Itinerary.

# PEDIGREE; Exhibiting the relationship of King Henry VII., and of the Tudors, with the Beauforts.

King Edward III. = Queen Philippa.

4th son, John of Gaunt,  
Duke of Lancaster, had  
issue by Katherine Swin-  
ford before marriage.



Butler, Earl of Wiltshire, and a considerable army, as supporters of Henry VI., and on the 2nd February in that year, fought at the battle of Mortimer's Cross, against the Yorkists, under the command of Edward, Earl of March, afterwards King Edward IV.; but the Lancastrian army was completely defeated, and the two earls were compelled to escape by flight. It may be fairly presumed that he was not present at the battle of Towton, in 1461, as he was not included in the list of those persons who were attainted by the act of parliament of 1st Edward IV., 1461, (Rot. Parl., vol. 5, page 477), for taking a part in that battle; yet he seems, nevertheless, to have been exerting himself in arms for Henry VI. about that time, because in a subsequent part of the same act of parliament, he was attainted for having, with others, as alleged, at different times since the fourth of March, in that year, incited the enemies of King Edward IV. to enter the realm and to commence hostilities against him; and also for having made war against the king "at a place called Tutehill, besid' the towne of Carnarvan, in Wales, on Friday next after the Fest of Translacion of Seint Edward last past, rered werre ayenst the same our soverayne lord, purposying then and there to have proceeded to his destruction of fals and cruell violence ayenst their feith and liegeaunce." From that passage it can scarcely be doubted that an engagement between some forces of the hostile factions took place near Carnarvon, in 1461, but I am not aware that any historian has handed down to us any account of it, or even noticed it, an additional proof, if any were wanting, that much more bloodshed and misery were experienced in this country during the wars of the Roses than our old annalists and chroniclers have recorded. The Earl of Pembroke lost his rank, his possessions, in a word, his all, by the attainder, for all that he had was confiscated. His earldom was conferred upon William Herbert, of Ragland, and Jasper Tudor became an outlaw and a fugitive; and, as is very forcibly expressed by Baker, in his Chronicles, "The Earl of Pembroke went from country to country, little better than a vagabond." Again the scene suddenly changed. In 1470, William Herbert, the rival Earl of Pembroke, was captured by the Lancastrians, at the battle of Edgecote, in Northamptonshire, (usually called the battle of Banbury, from its contiguity to that town), and was beheaded. Jasper Tudor, who still claimed the title of Earl of Pembroke, landed in the west with George, Duke of Clarence, (who then sided with the Earl of Warwick, in the Lancastrian interest), and King Edward was driven from his throne and kingdom by the Earl of Warwick. Jasper Tudor was shortly afterwards restored to his rank and title, and a second time became Earl of Pembroke, resumed his possessions in Wales, and

finding his nephew, Henry, Earl of Richmond, then scarcely ten years of age, in the care of the widow of his deceased rival, William Herbert, Earl of Pembroke, he removed him from her superintendence, took him and presented him to Henry VI., who, on seeing him, is said (with what truth may well be doubted) to have made a speech almost prophetic of Richmond's future fortunes.

Another sudden and startling change occurred in this strange and wonderful drama. Edward IV. returned to England in 1471, obtained a decisive victory over the Earl of Warwick, at Barnet. Queen Margaret landed at Weymouth, the Lancastrians once more took up arms, and Pembroke proceeded to raise forces in Pembrokeshire, with the intention of succouring her. The disastrous battle of Tewkesbury, and the consequent utter ruin of the Lancastrian party, compelled him to retire to Chepstow, and to disband his forces. He then had a very narrow escape with his life. Edward IV. sent Roger Vaughan, a valiant person, to surprise Pembroke there; but he captured Vaughan, beheaded him, and proceeded from thence to the town of Pembroke. Still he was in imminent danger; Morgan-ap-Thomas pursued him, and commenced the siege of that town, but David-ap-Thomas, the brother of Morgan-ap-Thomas, although of the party inclined to assist Jasper, came to his assistance, and succeeded in raising the siege, and Pembroke got from thence in eight days, and sailed with his nephew, the young Earl of Richmond, from Tenby, intending to proceed to France. His ill fortune still prevailed; the winds drove them upon the coast of Brittany; they were forced to put into a port of that country, and could not well be excused from paying their respects to the Duke of Brittany, but when they would have taken their departure, they were given to understand that they were not at liberty to proceed. The Duke of Brittany, considering that these two noblemen might be of some advantage to him, assigned to them the town of Vannes for their residence. They were outwardly treated with all respect due to their birth and rank, but were narrowly watched. Pembroke's exile was a protracted one, and he remained abroad, an outlaw, a fugitive, and in poverty during several years, most of which he passed in Brittany, but a short time was spent in France, just before his return to England as after-mentioned. His earldom was conferred by King Edward IV. upon his son, Prince Edward, and was afterwards held by King Richard III. At length, in consequence of the death of Edward, the odium and unpopularity in which Richard was held by many, and the English nation being at last weary of civil war, violence, and bloodshed, the prospect was open of his return to England, and of the accession to the throne of his nephew, Henry, Earl of Richmond.

In October, 1483, a scheme was set on foot to effect a hostile landing in England by the Earl of Richmond with some forces, which were intended to have been supported by Henry Stafford, Duke of Buckingham, and others. That expedition was an utter and disastrous failure; Richmond's fleet was dispersed by a storm, and, although the ship in which he sailed appeared off Poole, in Dorsetshire, he found it dangerous as well as useless to attempt to land, and was compelled to return to Brittany. The insurrection was suppressed, the duke was executed, and Jasper Tudor, with the bitterness of disappointed hopes, was again doomed for some time longer to remain in banishment. The old historians do not expressly mention his having been with Richmond in that expedition, but it seems quite impossible to doubt the fact of his having accompanied him.

Once more the scene changed in this most strange and eventful drama. In 1485 the Earl of Richmond and Jasper Tudor, with some few troops from France, landed at Milford, in South Wales, and having been joined by their friends and supporters, the battle of Bosworth (at which the latter had a principal command) placed Richmond on the throne of England, by the title of Henry VII.

By that event Jasper Tudor found himself, for the third time, Earl of Pembroke. He was restored to his honours and possessions, created Duke of Bedford, made one of the privy council, and one of the commissioners for executing the office of High Steward of England, on the occasion of the ceremony of the coronation of Henry; also Justice of South Wales, and Lord Lieutenant of Ireland; and had besides considerable and valuable possessions, lands, and offices conferred upon him.

In 1487 he was joint General with John De Vere, Earl of Oxford, at the battle of Stoke, when the Earl of Lincoln was defeated. He was afterwards again appointed joint General, with the Earl of Oxford, of the army sent into Flanders, in aid of the Emperor Maximilian, against the French. He married Katherine, sixth daughter of Richard Wideville or Wodeville, Earl of Rivers, sister of Elizabeth, Queen of Edward IV., and widow of Henry Stafford, Duke of Buckingham, who was executed as before mentioned in 1483. He continued to enjoy his titles, rank, and great possessions until his death, which took place on the 21st of December, 1493. He did not leave any issue, and was interred in the abbey of Keynsham.

Is it possible to find in the whole history of the English peerage a nobleman who had experienced more strange and astonishing vicissitudes of fortune? Well may it be said that truth is stranger than fiction.

## TWELFTH ORDINARY MEETING.

ROYAL INSTITUTION, April 14, 1856.

THE REV. H. H. HIGGINS, M.A., in the Chair.

THE Rev. H. H. Higgins exhibited several Jewish Coins, the shekel, however, being accounted, by the Rev. A. Fischel, modern.

Dr. Thomson read a communication on the Proceedings of the Liverpool Compass Committee.

The following paper was then read:—

## ON THE ADULTERATIONS OF FOOD,

By H. SUGDEN EVANS, F.C.S., AND NEWTON SAMUELSON, F.C.S.

THE attention of the public has been much directed of late to the subject of the adulteration of food, by the appearance of a series of articles in the *Lancet*, purporting to be the reports of a commission duly appointed to investigate the subject, and more recently, by the re-appearance of these papers in a book. The statements they contain have very naturally excited alarm, and the subject was thought of sufficient importance last year to warrant the appointment of a parliamentary committee, whose sittings are at present being held.

At all times the subject of adulterations is of great importance; but never, we think, did it assume so grave an aspect as at the present, when men, hitherto considered respectable and honourable men of business, are publicly accused of wholesale adulteration, and the public is excited, beyond measure, by the appearance of statements which we trust are overdrawn and exaggerated.

We think it behoves those in whose province the examinations of such matters come, to make known the results of their experience, either to confirm the statements alluded to, or, by contradicting them, to allay the general alarm and disgust they have engendered. With this object in view, I have, in conjunction with my friend Mr. Newton Samuelson, submitted samples of the chief articles of food to careful examination, and our results we propose to lay before the Society this evening.

It would be proper to commence the subject by a consideration of water and its contaminations, but this would furnish matter for a distinct paper, and occupy too much time to be considered this evening in connexion with the other matters contemplated; we must, therefore,

content ourselves by simply promising that, while much importance attaches to the purity of water used in culinary and other operations, we cannot but think the reports just alluded to have been exaggerated, and the subject greatly overdrawn, and are calculated to produce disgust without any adequate benefit. The softest water procurable should be used for all culinary purposes, but in manufactures it is often found desirable that a proportion of mineral salts should be present. This is especially the case in the brewing of beer and manufacture of vinegar; and hence, that water which contains the largest proportion of sulphate of lime produces the best and most persistent results: arising, no doubt, from the antiseptic properties of that salt.

The purest water for culinary purposes may generally be drawn from the clouds: rain water filtered and boiled is of great purity, but is subject to much greater contamination from the vessels it is contained in, if they be of metal, than the hardest spring water would be. Not long since an instance of this kind came under our notice. A sample of rain water from a suburb of this town was brought to me for analysis, very alarming symptoms having been produced in those who had been consuming it. We were not long in discovering a very decided quantity of lead, derived from the leaden tank it was collected in on the roof of the house: and this is invariably the result, in a greater or less degree, of storing rain water in leaden cisterns. Hard spring waters, on the contrary, and especially those containing sulphate of potass, would exert but a very slight action upon the metal. Thus we see, that while rain water, when kept in non-metallic vessels, is the best suited for the preparation of food, when stored in metal reservoirs it is far more liable than the hardest water to become contaminated, and in time positively poisonous.

FARINACEOUS substances form by far the largest proportion of our diet, and therefore we will first examine

#### Flour and Bran.

Flour should consist of finely ground wheat freed from its adhering husk. Such, Dr. Hassel tells us, he found to be the case with all the samples he examined.

In the examination of flour and other organic substances of a like nature, the chemist, armed by the microscope, is almost powerless to determine the structure of inferior kinds with the more valuable; we have therefore, throughout our examinations, combined a microscopical with a chemical analysis.

Flour may be adulterated with mineral substances, such as gypsum, chalk, alum, salt, &c. or with inferior farinaceous substances, such as

potato-farina, Indian meal, rice, rye, barley, oats, or pea and bean meal, and occasionally *bone dust*. The former of these are readily detected by chemical means, the latter almost entirely by the aid of the microscope.

The microscopic characters of wheat flour are clear and distinct, resting upon the shape, size, and markings of the starch grains. These are large and small bodies composing the chief bulk of the flour; the smaller grains are globular in form, and do not present any very striking characters; the large ones, however, consist of flattened round disks, convex on one side, flattened on the other; in the centre is a minute spot, around which is a series of concentric rings extending to the margin. This spot is more or less visible in all starch grains, though it is very variously shaped and placed, and the annular markings, which in wheat starch form very delicate and scarcely preceptible rings, present a very varied, yet, in each respective kind of grain, persistent appearance. These characters are modified by circumstances; disease or decay will entirely change their appearance, if not obliterate them altogether. Moisture and heat rupture the grain, and hence we may readily determine whether samples of flour have been ground from sound, diseased, or damaged corn, by the more or less distorted appearance of the starch grains. The microscopical characters of the other starches with which wheat may be contaminated are equally distinct. [Magnified drawings of these and the other articles were exhibited.]

Besides a microscopical examination, the samples of flour were submitted to careful chemical analysis. One thousand grains of flour worked into a dough with water, were kneaded in a fine hair sieve, under a stream of cold water; we thus obtained a milky fluid passing through the sieve, and a glutinous mass remaining in it.

The milky liquid deposits *starch*, from which the clear supernatant liquid is decanted and boiled; a coagulum of *albumen* separates, which is washed, dried, and weighed; the clear liquid, separated, is evaporated to dryness in a water bath, and yields *sugar and gum*.

The glutinous mass left in the sieve is boiled, first in strong and then in weak alcohol; the solutions mixed and filtered while hot, give a residue of *fibrine*, while the hot alcoholic solution deposits *caseine* on cooling; the filtered solution being evaporated to a syrup, and water added, a precipitate of pure *gluten* is formed. Thus, by carefully collecting and drying the various deposits we can weigh them, and determine with great accuracy the proportions of bran or fibrin, caseine, gluten, starch, albumen, sugar, and salts; the amount of water being determined in the usual way, by loss at a temperature of 212°. Such a complete analysis as this is not, however, necessary or desirable



in a general way for commercial purposes ; it suffices to determine the proportion of moisture, starch, gluten, and sugar, as well also as the mineral salts which may have been added for purposes hereinafter to be described.

These salts may be determined in the following manner, with sufficient accuracy :—a proportion of suspected flour is triturated in a sieve with water, as above described, the milky fluid being collected in a conical shaped glass: when the starch has thoroughly subsided the clear liquor is decanted off, boiled and filtered ; to one portion hydrochloric acid and ammonia are carefully added, when, if *alum* be present, a more or less copious gelatinous precipitate will be produced: this is *alumina*. To the other portion chloride of barium is added, when a white precipitate will be formed if sulphuric acid be present ; and these two re-actions are conclusive evidence of the presence of *alum*, the quantity being calculated from the weight of aluminous preparation obtained from the whole quantity of liquor.

The starchy deposit is dried in its conical glass, from which it is then readily removed. The tip of the cone, which of course will contain all the denser matters, is removed and digested in cold water ; the clear liquor is filtered off, and tested with chloride of barium and oxalate of ammonia ; white precipitates with these re-agents clearly prove the presence of sulphate of lime, or *gypsum*. The residue left after digesting the deposit in water is treated with hydrochloric acid ; effervescence indicates the presence of chalk, which must be confirmed by the addition of oxalate of ammonia to the filtered solution, which will give a precipitate if lime be present.

Besides these tests a portion of the flour must be boiled in water slightly acidulated with hydrochloric acid ; or, what is better, burn and calcine the ash of a portion of the flour, and treat it with dilute acid, filter, and add acetate of potass with a few drops sesqui-chloride of iron ; if bones have been mixed with the flour, a copious white precipitate of phosphate of iron is produced.

Various chemical tests have been proposed for detecting admixtures of other farinaceous substances with bread and flour, but having found that the microscope furnishes the readiest and more certain results, we have deemed it sufficient to confine ourselves to its indications.

Having submitted many samples of flour in this way to examination, we have found that, as a rule, the public are supplied with a genuine article, although an occasional exception has come under our notice. Thus, we remember some time ago examining a sample of flour which had evidently been prepared from, or largely admixed with, damaged wheat, as a vast proportion of the starch grains were ruptured, and

more or less collapsed, while a large quantity of alumina was found, arising from the addition of alum, made no doubt for the purpose of overcoming the damaged wheat, and making the flour bake as well and as white as the best. Another sample of French flour, of great weight, was found to contain a very considerable quantity of gypsum; while in a third the characteristic starch grains of pea meal, and a little bone dust were brought to light.\*

With these few exceptions we have found flour to be genuine; but in all, more or less of *alumina* was detected; which we think arises from the addition of small portions of alum in the process of grinding, and we certainly are not prepared to say that this slight addition is capable of exerting any injurious effect upon health; for our experiments go to establish the theory proposed by Liebig, that during the process of baking the alum is destroyed: but of this we shall have to speak more fully in reference to the next article of food which claims our attention, namely bread.

BREAD, emphatically termed the staff of life, has long been looked upon with suspicion, and many are the laws and regulations which have from time to time been formed for the protection of the public against fraud in this most important and necessary article of diet; yet how defective these laws are, and how easy it is to evade their power and intention is daily proved by the amount of alumina found in the bread as supplied to the public, and the rapidity with which a loaf loses weight by keeping.

We have not found that other grain than wheat is employed in the manufacture of bread in this part of the country,† but we do find that substances are mixed with the flour, which cause it to retain a larger proportion of water, and cause a damaged or inferior flour to produce as saleable a bread as the best. Mitchell tells us that it is a universal custom in England to mix boiled potatoes with the dough; such an addition would of course greatly increase the weight of bread produced, but diminish its nutritive properties at least twenty per cent. We scarcely feel prepared wholly to contradict this statement, but in numerous samples of bread we have examined, we have failed to discover any appreciable quantity of potato starch, or the starch granules of any other grain, and our samples have been drawn from all sources, though confined to white bread.

But for the purpose of increasing the weight of the bread, and of

\* Since reading this paper Mr. Evans has examined two samples of flour, which contained large quantities of the sporules of the *uredo fungus*, that produces the smut in wheat, and in one they existed to a most injurious extent.

† Since this was in type we have discovered a pretty uniform admixture of Maize or Indian Corn Flour in the bread of one of our most esteemed bakers.—H. S. E.

bleaching or otherwise working up damaged flour various salts are used. Of these the most common, and that against which the greatest outcry has been made, is alum. This salt is almost invariably used, notwithstanding a very stringent law specially framed to prevent its use, but so easily is this law avoided that in many parts bakers refuse to work unless their accustomed bag of *stuff* is in its wonted place in the bakery, and the master has no difficulty in granting their demand, unless perchance his own conscience interfere.

The effect of this addition is to increase the whiteness of the bread, to enhance its hygroscopic properties, so that the weight is augmented by retained moisture. It imparts a sweetness to damaged flour not otherwise possessed, and last not least, it greatly facilitates the separation of the loaves when baked, a desideratum of no mean importance to the journeyman baker.

The action thus exerted by the alum is undoubtedly of a chemical nature, and one, we imagine, closely allied to that which takes place when alum is used as a mordant in the process of dying. The important position alum occupies in this process, to precipitate and fix the colour, is too well known to require comment here; suffice it to say that the alum, consisting of a double sulphate of alumina and potass, suffers decomposition, the earthy alumina being precipitated in combination with the colouring matter. In the process of baking bread containing alum, we conceive a like decomposition takes place, the alumina combining with the colouring and other nitrogenous matter of the flour, while the sulphate of potass is liberated as a free salt, so that instead of the bread containing an astringent and irritant double salt, it simply contains the elements of that salt in a new and *perfectly innocuous combination*.

This is by no means a novel theory; but it has not, we think, received that attention which it deserves. For the purpose of determining its validity we have submitted various samples of bread to analysis, known to have been made with the addition of alum, but in no case were we able to isolate, in crystals or otherwise, a single trace of the astringent double salt of potass-alum, and we feel perfectly certain that where the admixture of alum and process of baking have been dexterously conducted, it is impossible to obtain a single grain of alum in its original state. We have found alumina in varying proportions in the ash of all the breads we have analysed.

If this theory be correct, and our experience tends to establish it, then we think the great objection to the use of alum is removed, for it is so entirely decomposed as to become perfectly harmless; and seeing that its addition renders inferior flour perfectly wholesome and equally

palatable with the finest, thus rendering it available for the food of man, we think its use, under certain restrictions, might be very advantageously allowed.

But before quitting the subject there are other substances of a mineral nature employed for the sophistication of bread, which demand our attention for a few moments. The chief of these are sulphate of copper, gypsum, carbonate of magnesia, and alkalies. On the continent sulphate of copper is said to have been extensively used. Its action is curious, inasmuch as a very minute proportion gives the flour the property of retaining an enormous amount of moisture without the bread becoming unduly soft. Thus one ounce added in solution to enough dough to make fifty quartern loaves, is sufficient to augment its weight 1-16th. A larger proportion than the  $\frac{1}{16000}$  gives an unpleasant smell to the bread. The use of this salt, in addition to defrauding the public of 1-16th of the bread they pay for, makes the bread highly injurious to health, and a continuance of such diet would, undoubtedly, in a short time produce alarming, if not serious consequences. Fortunately its presence is very readily discovered; the addition of a solution of ferrocyanide potassium to a decoction of bread will produce a more or less reddish brown precipitate, if the minutest trace of copper be present.

For a very similar purpose sulphate of zinc has sometimes been employed; its use is attended with equally dangerous results, and it may be detected by evaporating an infusion of bread to small bulk, filtering, and adding an excess of ammonia and sulphuretted hydrogen; if zinc be present a white precipitate will fall. These very dangerous salts are not used in this part of the country, for all the samples we examined were perfectly free from both copper and zinc.

Other means, however, are adopted in this country for accomplishing a similar object; thus, we have met with bread containing so much alkali as to be extremely bitter and caustic to the taste, and even offensively alkaline to the smell, owing to the addition of potassa for the purpose of increasing its power of retaining water. Lime water is often used for a somewhat similar purpose, and its power is not unfrequently augmented by carefully covering the bread, when drawn from the oven, with a blanket to prevent the evaporation of moisture. Alkalies are also used to neutralize the acidity of sour flour, for which purpose there is no doubt that the carbonates of ammonia and magnesia are often employed.

From our examination, chemical and microscopical, of bread, drawn from all sources in this town, we conclude that other than wheat flour is seldom used; but this is frequently of very inferior quality, and often

so damaged as to be unfit for use, yet by the addition of certain chemical agents it is manufactured into very passible bread: that alumina was present in all the samples, and from its quantity we conclude it was derived from alum; but with regard to this we feel sure (comparing the results of our examination of flour with those of bread), that in many cases the baker is innocent of its introduction, it being added to the flour while at the mill.

ARROWROOT next claims our attention. Dr. Hassal states, with regard to it, that out of 86 samples, he found 40 more or less adulterated with a mixture of potato and sago flour, while ten consisted wholly of these farinas. We are frequently in the habit of examining samples of arrowroot as imported, but have usually found the different varieties genuine, although an occasional instance of an admixture of potato flour has occurred. We regret, however, we cannot speak in so satisfactory a manner of the article with which the public is supplied; here we have found numerous instances of admixture, and the substitution of inferior kinds for the more costly—thus, of five samples purchased at various times as the *finest* Bermuda arrowroot, and paid for accordingly, we found one consisted wholly of *Jamaica*, another entirely of *St. Vincent*; the third, nearly all *damaged Jamaica*; the fourth, chiefly *St. Vincent*, with a proportion of *potato farina*, and the fifth *Bermuda*, *mixed with potato and damaged grain*.

We can scarcely blame the retail dealer for this substitution, for many are utterly unable to detect the difference, and sell in ignorance the one for the other. Only by the microscope can the differences between the various species of *Maranta* arrowroot be detected, and with the aid of this instrument, great experience in the examination of such substances is required; for so minute are the characters by which *Bermuda* arrowroot is known from *St. Vincent* or *Jamaica*, that they might be readily overlooked; nevertheless, when known, they serve, in the hand of an experienced microscopist, to point out the variety with certainty.

We have also found that many samples as served out to the public, besides those already spoken of, were more or less mixed with potato farina, in one instance to the amount of 20 per cent. at least, but, as might be supposed, these mixtures were found most frequently amongst the inferior shopkeepers, *who will not give, and cannot get from their customers, a fair price for a genuine article*. We do not wish it to be inferred that *genuine* arrowroot is *not* to be procured; on the contrary, we have found that from most respectable dealers a genuine *Maranta* arrowroot may be obtained, though not unfrequently the *Bermuda* kind is replaced in ignorance by the *St. Vincents*.

Before closing our remarks on the farinaceous foods, we might have occupied some space with a notice of such articles as are put up in neat packages, and accompanied with the "highest testimonials," but time will not permit; suffice it to say, that in the vast majority of cases, *they are the quintessence of quackery*, and under the guise of medical recommendations, the *vilest trash imaginable* is palmed off upon the public, and at the most exorbitant prices; we cannot do better than refer to Dr. Hassal's work, whose observations and reports on these quackeries we most cordially endorse.

We have on a former occasion\* brought before this Society the subject of tea and coffee; we have little to add to what was then stated in regard to their adulteration. Dr. Hassal tells us, that out of 58 samples, 16 were adulterated, these being scented Pekoe and caper, and a kind of black gunpowder. The adulteration chiefly consisted of *lie tea*; this consists of sand and tea dust made into shot-like balls, with gum or rice water, and painted green or black with *Prussian blue and mineral yellow*, or with indigo and graphite; we have met with very inferior black teas painted up, and made to yield a strong infusion by a superficial coating of catechu or kino.

Of GREEN TEAS, Dr. Hassal found 13 out of 20 adulterated with lie teas, and all of them artificially coloured with Prussian blue, mineral yellow, and gypsum, thus confirming the results we have already laid before you. Formerly, green tea was never imported free from this artificial colouring or blooming, but some dealers have introduced green tea free from this bloom, and ere long we trust the public will be able to luxuriate in natural and wholesome olive green teas, instead of the spuriously blooming varieties hitherto so highly prized. It is gratifying also to learn that the importation of "*lie teas*" has nearly ceased.

COFFEE we still find is "improved" by the addition, *ad libitum*, of chicory, and will no doubt continue to be so as long as the public remain so callous about it. Dr. Hassal tells us that out of 125 samples 110 were more or less contaminated with chicory. We have found it in nearly all the samples we have recently examined, and can fully confirm the result formerly arrived at that the *amount* of adulteration increases, and its *quality* decreases as the locality from which the coffee is obtained decreases in the scale of respectability. There are, however, respectable men who continue to supply a perfectly unsophisticated article, notwithstanding the number who seek to please the public by the addition of chicory.

We have not paid so much attention to the subject of Cocoa and

\* On the Teas of Commerce, &c., by H. S. Evans, "Proceedings," vol. vii. p. 119; on the Coffees of Commerce, &c., by H. S. Evans, *Ibid.* vol. vii. p. 140.

CHOCOLATE as they deserve, and are scarcely prepared to express an opinion with regard to Dr. Hassal's report upon them, which is to the effect that only 8 samples out of 56 were genuine; in 43 he found from five to fifty per cent. sugar, and in 46 a similar proportion of starch—potato starch in some, and various mixtures in others. In all the samples we have examined we find abundance of starch, chiefly potato and wheat, and in some a large amount of sand.

MUSTARD is a substance of very extensive and daily consumption, and is subject to wholesale adulteration, but for what reason we are at a loss to guess, unless it be indeed to accommodate the public with a bright and pretty looking article at a low price.

The detection of the adulterations of mustard is very simple by the aid of the microscope. The characters of the seed are exceedingly distinct. It is composed of several membranes differing from each other, in the form of their cells. The external membrane is composed of large colourless angular cells, in the centre of which is an apparent nucleus cell, but which, on more close observation, resolves itself into a simple hair, arising from the folds of the cell membrane; these cells are filled with mucilage, which, on being moistened, swells and fills out the cell. The membrane immediately beneath this consists of a single layer of angular or rounded cells, having a very decided central nucleus; they adhere firmly to each other, and form a consistent membrane. These two membranes form the most characteristic features of the mustard seed, the remainder being composed of cellular and vascular tissue filled with oil globules. Starch grains are very rarely found, especially if the seeds be fully ripe.

We have examined many samples of mustard flour, as served to the public, but in all we have found an enormous quantity of *wheat starch*, in some cases to the extent of fifty per cent.; these mixtures are coloured with turmeric generally, and we understand in some cases *chrome yellow*, but we have not met with an instance: the necessary pungency is produced by the addition of *cayenne pepper*.

The microscope is sufficient to detect all these adulterations—wheat flour by the appearance of its starch grains; turmeric, by the most characteristic form of its colouring matter (but the character of this is still further demonstrated by the addition, under the microscope, of a drop of Liq. Potassæ, which has the effect of turning the particles of turmeric *brown*; but if the colouring matter be chrome yellow they become *much paler*, or no change whatever takes place). The admixture of wheat flour and turmeric with mustard flour has become so general that long usage has rendered the sophisticated article more popular than the genuine, for though this would be vastly more pungent,

its colour is in the first instance very dark and dirty looking, and soon becomes quite black.

Next in importance to mustard, PEPPER is most largely used. It also is mixed with flour and other organic matters, but we have failed to find any mineral ingredient. Here also the microscope furnishes the readiest means of discovering admixtures, as the histogenic characters of the pepper corn are very distinct. There are two kinds of pepper in commerce, the Black and the White. The former consists of the *semi-ripe* berry, plucked from the tree and dried entire. This possesses the peculiar pungency and acidity for which pepper is so highly prized, in a much greater degree than the white pepper, which consists of the *fully ripe* berry, denuded, by maceration, of its epidermal coat. This coat, constituting the husk, is composed of several membranes. The outermost consists of large, thick walled, deeply pitted cells, filled with a dark brown colouring matter, and united to form a continuous membrane, by a lacework of small cubical cells, firmly adherent to one another. Immediately beneath this is a delicate membrane, consisting of distinct thin walled cells, of a somewhat rounded or elongated form, and filled with a greenish colouring matter; the remainder of the husk consists of several rows of large, loose, irregularly formed cells, filled with innumerable *yellow oil globules*. None of these forms of tissue should be found in *white pepper*, but separating the husk from the body of the seed, bundles of vascular fibre, consisting chiefly of spiral vessels, are found; these are in part removed with the husk, but in part remain. The external layer of cellular tissue, forming the body of the seed, consists of longish, thick walled cells, loosely attached to each other, and filled with a brownish grey granular matter; these are interspersed by groups of cells of a somewhat similar shape and size, but more adherent, and filled with a dark orange yellow substance. The body of the seed is composed of large cells, slightly adhering to one another. The more external cells are emptied and more or less collapsed, and their walls very much pitted and broken up, the interspaces being filled with oil globules; but as they approach the centre of the seed the cells become filled and more rounded in form, and many of them assume a yellow colour after long soaking in water—these are the cells which contain piperine, the peculiar acrid principle of pepper. The others are filled chiefly with small angular starch grains and delicate acicular raphides. All these forms should be present in ground *black* pepper, but in ground *white*, only such as we have described as composing the body of the seed. In those samples of pepper we have examined, we found large quantities of starch. One sample we examined some time since contained very large quantities of wheat and sago flour, having a very white



appearance. In some samples we have found large admixtures, varying from twenty to thirty per cent. of rice flour, and in others wheat. There is some danger of confounding the natural pepper starch grains with those of rice, as their shape and size are exceedingly similar; they differ, however, in their manner of grouping; the starch grains of pepper readily detach themselves, and are usually seen singly; rice starch grains, on the other hand, are found grouped in masses, which might readily be mistaken for single starch grains of a larger variety.

Not unfrequently an undue proportion of husk, arising from the admixture of pepper dust, is found in the ground black pepper, and the husk of the linseed has been detected, arising, no doubt, from an addition of linseed meal to the pepper.

We now pass on to GINGERS, of which there are many qualities, varying very much in value. Some of these, when cut, present a hard resinous and black appearance; others are soft and fibrous, or floury and stringy—these have fallen victims to the ravages of insects that have eaten away all their starchy parts. The finest qualities of young plump rizomes, cut with a fine soft, velvety surface, of a pale lemon colour, and emit an agreeable pungent lemon odour. Jamaica and some other kinds of ginger are decorticated, but others, such as the Barbadoes, are imported with their natural epidermal coat upon them. This coat consists of several layers of transparent angular cells, of a brownish colour, with thick walls, and cohering with great tenacity. The presence of this structure then in powdered ginger, affords a pretty certain indication of the use of an undecorticated and inferior variety of ginger. The body of the rizome is found to consist of cellular tissue, the membrane of which is excessively thin and minutely pitted. The cells are filled with abundance of starch grains, of an ovoid and flattened form, the nucleal depression being placed at the narrow end. These grains are so transparent that this depression is only apparent in a few, and the concentric rings, which are very regular, are but faintly visible. Many of the cells contain, besides the starch grains, a yellow colouring matter, much resembling the coloured particles of turmeric, though somewhat paler. The cellular structure is interspersed with numerous bundles of vascular tissue, containing well developed spiral vessels. The cells immediately beneath the epidermal coat are filled with numerous oil globules, and on this oil depends the aroma of the ginger.

Powdered ginger is very frequently mixed with other substances, such as rice, wheat, sago, and, in fact, any other kind of cheap, damaged, or otherwise unsaleable farina.

The finest prepared ginger should consist of the pure farina, sifted from the lightly crushed, unbleached Jamaica root; but as the public

will not pay a price sufficient to remunerate the dealer for so costly a preparation, and still demands a fine, soft, and bright powder, the grinder has to resort to the plan of supplying the place of the fibre thus removed, by an equivalent of flour or some other soft grain. A powder is thus obtained of nearly the same strength as the ginger (if ground entirely—fibre and all) would have produced, but of a much finer and prettier aspect, for the inert fibre gives to the powder a dark, dirty, and very specky appearance.

Under the name of prepared ginger many villanous compounds are, we fear, often imposed on the public. We have ourselves met with a very pretty sample, which, on examination, was found to consist of only one part of ginger to three parts of a mixture of wheat, sago, and Indian meal, coloured with turmeric, and made pungent by an addition of cayenne pepper. All the samples which my friend, Mr. Samuelson, and myself have examined, we find to contain extraneous farinaceous matters, with but one exception. One sample contained a little rice, and being *very* highly coloured we found abundance of turmeric. In other samples we found much larger proportions of rice, and in some a mixture of wheat flour. One sample we did meet with free from farinaceous matters, but it was not as represented, "Prepared *Jamaica* Ginger," for we found abundant evidence of the epidermal coating of ginger and a small quantity of turmeric; it had evidently been ground from an undecorticated root. It is extremely difficult to obtain prepared ginger such as we first described, yet for medicinal purposes it is prepared, and in certain localities it may be procured by paying a proportionate price. The difference between it and that usually sold as the best is very striking, and for medicinal purposes none other should be used.

We have examined some of the other spices, such as CLOVES, NUTMEGS, &c., but have not found them adulterated. CINNAMON we have met with in a powdered state consisting wholly of *cassia*, and are inclined to believe that cassia is very generally substituted for the more costly cinnamon, when used as pudding spice, &c.; but for medicinal purposes we think a true powder is invariably used.

At the conclusion of the paper on "Coffee and its Adulterations," in 1852, we ventured to express an opinion that a great boon would be conferred upon the community by the establishment of efficient examiners of food, in all large towns, with full power to condemn all adulterated and spurious articles. On again returning to the subject of adulterations, with Mr. Samuelson, we see no reason for changing an opinion we both fully concur in; and although we do not feel prepared to

endorse *all* that Dr. Hassal and others have put forth on the subject, yet our experience tends to establish the fact that food is adulterated to a *very great extent*, and that in an inverse ratio to the professions made ; thus, where we have heard the greatest outcry against adulterations, and at those establishments where extracts, &c., from the reports of "learned professors" on the analysis of their articles are conspicuously placarded, we may expect to find sophistication in full play ; but it will be generally found that at the unpretending, steady-going establishments genuine articles may be obtained, and not only do these remarks apply to food, but to commodities of all kinds. We do not wish, however, to lay all the blame of this system of fraud, if it may be so called, to the dealer, wholesale or retail ; the public, we think, is equally to blame, for as long as the public insists on *cheap*, or rather *low priced*, commodities, and so long as it is satisfied with what it gets at the price, so long will the excessive competition that exists compel the dealer to sell such an article as he can profit by.

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### THIRTEENTH ORDINARY MEETING.

ROYAL INSTITUTION, April 28th, 1856.

T. C. ARCHER, Esq., Vice-President, in the Chair.

Sir John S. P. Salusbury was elected an Ordinary Member.

Mr. Driffeld's resignation was received.

Mr. Byerley exhibited the *Leptocephalus Morrisii*, or Anglesea Morris, an exceedingly rare fish, taken here at low water ; also the *Lerneæ bronchialis*, a parasite from the gills of the cod fish.

The Rev. H. H. Higgins communicated some observations upon the habits of the *Tipula*, showing the use of the long legs in the process of depositing the ova.

Mr. Marrat exhibited the first number (1805) of the "Liverpool Cause List."

Mr. T. C. Archer exhibited a curious gall from Asia, known there as the apple of Sodom ; also flowers of the clove tree, expanded and in

bud ; likewise preparations of hemp used in Africa for smoking, put up in a peculiar manner, from the Bight of Biafra.

The following paper was then read :—

ON SOME OF THE MENTAL AND SOCIAL PHENOMENA  
OF THE DAY, WITH THEIR POETICAL SOLUTION, AS  
ILLUSTRATED BY TENNYSON'S "MAUD."

By J. C. REDISH, Esq.

THE civilization of the present age is so often dwelt upon and so much applauded that it may not be amiss if we examine carefully into one of its manifestations, and enquire in what degree it is truly entitled to our admiration.

"The development of the individual and mental existence—the development of man himself, of his faculties, sentiments and ideas," is pronounced by M. Guizot, as proclaiming, with no less uncertainty than "the development of society, properly so called, of the relations of men amongst themselves," that a nation is truly civilized ; and of all active mental existence, that which attests the poet is the highest. In entering then into the enquiry, whether the last poem of England's Poet Laureate be worthy of his fame and our admiration, we are at the same time indirectly enquiring whether, in one of the great tests of civilization, we are entitled, as a nation, to the fame we boast and the rank we claim ; for we think we are justified in the assumption that the nation, at the present day, is content to accept Tennyson as its representative poet, and is prepared to allow its poetical pretensions to stand or fall with him. Poets have been pronounced the "unacknowledged legislators of mankind," and there can be little doubt of the immense influence they have exercised over the destiny of man ; in seeking, then, to learn whether the natural influence which is now wielded by Tennyson be rightly and legitimately used—in other words, whether he is true to his high vocation,—we shall also learn whether we may look for good or evil as the result of the tendencies of the present age.

Just in proportion as the poet's view of human life is true—just in proportion as he is enabled, by the light of a pure creed, to view man and his destiny aright—and so far as he succeeds in embodying the truth he has to proclaim in a garb that will attract and a form that will endure ; so may he hope, by appealing to the higher part of man, his nobler sympathies, his unselfish feelings, his love of the beautiful, to rouse him to loftier views of truth, and, as a necessary consequence, to more ennobling action.

Now we believe that this correct view of life is one of the chief

characteristics of Tennyson's poetry: no mere idle dreamer is he; no warring insecter of the heart's deepest pang; not luxuriating, as some poets have done, in the mere exaltation of intellectual power; but with a clear and, as we believe, a true conception of the necessities of men in general, and of this age in particular. For this is one of the great features of a poet, that while in the single examples he takes, he is true to the life in depicting individual character: his illustrations are not only singly true, but contain and manifest the universal law. Hence, while primarily suited, as they were written, for a particular period, the productions of a great poet are read, understood, and appreciated in all ages and by all men. Every poet reflects, in one way or another, the tendencies and predominant ideas of the age in which he lived. Homer reflects the warlike spirit of his age; the Greek tragedians the fantastic opinions of theirs; Horace, the epicurean tone of Roman society; Tasso and Ariosto show that in the age of chivalry they lived and wrote; Dante and Milton exhibit the religious throes that moved their times; in Shakspeare we see that Christianity had exercised its influence over the poet's view of human life, and that the drama was no longer classic but romantic; Byron reflects at once the scepticism and the libertinism of his time; yet in the writings of each of these poets, varied as they are, we find also reflected our common humanity. The case is the same with Tennyson; looking at life from the nineteenth century point of view; choosing not for hero either Crusader or Pagan warrior, he exhibits the men and women of the present age, in the thoughts that occupy them, and, according to his power, endeavours to guide aright those thoughts and energies. "It is Tennyson's catholic sympathy with modern life in all its characteristic phases that is his distinguishing quality; and that, in combination with his formal poetic skill, renders him the favourite poet of the cultivated classes."

We consider that "Maud" is to be judged by these considerations; taking the characters from ordinary every day life, accompanied only by the incidents with which we are constantly familiar, he yet succeeds in rendering the characters of the poem types, not merely of a class but of humanity, and shews, with a fidelity that cannot be resisted, that here, in this practical England of the nineteenth century, with all its selfishness and its apparent non-recognition of aught but what appeals to it externally—that even here the eternal elements of tragedy may be found, and that they do not fail to work out their appointed purpose. We consider it absolutely essential to the right understanding and appreciation of "Maud" that this view should be clearly held, for it at once disposes of the only serious charges that are brought against it.

This poem is essentially tragic in its aim and construction, the progress of the story being shewn, and the characters of the personages being developed by what they themselves say or do, not by what the author narrates of them. Hence, the first object of enquiry will naturally be, whether the characters of the poem are such as might probably be found in the age chosen by the poet; and next, whether they are animated by the broad principles of our common humanity, modified and diversified by the special peculiarities of their various mental idiosyncrasies. We consider that these questions will best be answered by an analysis of the piece.

The hero, who finds himself at twenty-five,

“Sick, sick to the heart of life,”

occasioned by the family misfortunes that had overwhelmed him, and over which he had continued to brood whilst

“Living alone in an empty house,”

is evidently a being gifted, or cursed, as opinion may incline, with a more than ordinary sensibility of temperament, which leads him to take delight in dissecting the misery which afflicts him. From private grief to public wrong the transition is easy; those who groan under personal sorrow, occasioned by wrongs inflicted by their fellow-men, often look beyond their individual woes to the general law which seems to prevail in such cases. The hero is one of these; and the lamentations in which he indulges throughout the poem are as often directed against the social wrong which pervades the world, as against the individual wrong which afflicts himself. That such characters do exist at the present day, of deep, sensitive, even morbid natures, there cannot be a doubt, and we consider that the poet scarcely requires a justification for having chosen such a one for his hero; but we are bound to consider with deeper thought the subjects that he chooses for his invectives.

We have stated enough to shew that the mind of the hero is in no healthy state, but is in that morbid, hysterical condition which is nearly allied to madness. We state this clearly in the outset, for a charge has been promulgated against the poem that it is morbid, whilst we hope to shew that the poem is as free from such a charge as “Hamlet” itself. This point, however, we must leave till we reach the *dénouement*.

To a mind gifted with a deep sympathy for the wrongs of suffering humanity, the evils that exist around us at the present day must be particularly grievous. Poets in all ages have been among the first to see and denounce the evil tendencies of their time, and have too generally met with that neglect or scorn which bore witness to the

truth of their writings. That the lust of gold and the absorbing pursuit of selfish gain is the one great aim of most at the present day, cannot be denied, and in raising his voice against this state of things the hero is unquestionably right; yet it is these passages that are most strongly condemned by hostile critics, as if a false and malicious libel had been uttered against the age. It is now, as in time past—we stone the faithful prophets who rebuke us.

But from this state of listless, inactive, morbid selfishness, the hero is drawn by the power of love: the only influence that could be deemed sufficient to produce such an effect. The only remedy for the natural selfishness of the human heart is to be found in the exercise of the highest affection of man's nature; and in the sympathy which he finds in "Maud," he discovers the remedy for the selfish state of mind in which he had previously been.

After an analysis of the work the writer proceeded:—

Such is the poem that has met with the usual amount of attack—

"From the long-necked geese of the world, that are ever hissing dispraise,  
Because their natures are little;"

an opposition similar to that which greeted "The Princess," and "In Memoriam," when first they appeared: pieces which are now held up as shewing the height from which the Poet Laureate has fallen. We do not consider that this censure is deserved. The most serious charge that is brought against "Maud" is, that it is *morbid*: now if the author had stopped when the hero's mind was in that unhealthy state, from which, however, he was finally rescued, this charge might have been sustained. We must, however, remember the purely objective character of the poem, that this is no lyric effusion, that in the exhibition of morbid natures the highest triumphs of poetry have been won, and that a poem can only be pronounced morbid when its aim and tendency is to produce or encourage an unhealthy state of mind. But can this be maintained of "Maud?" We trow not. What man would rise from its perusal with an increase of selfish feeling, or a cynical contempt for mankind? Does it not rather prolong the key note, struck in "Locksley Hall," leading men to seek in self-denying action the true panacea for grief of heart? Let it be carefully noted that the hero never goes back to that selfish state in which he is first described. As Lear at length attains to a clear perception of the errors he had committed, and by that healthy discovery is restored to sanity, so in "Maud," the enlistment of the sympathies for a generous cause rescues the man who hitherto had only lived for self; nor can we imagine how persons can pronounce this poem morbid, and not include Hamlet and Lear in their censures.

Surely the finest exhibition of the poet's skill is shewn in depicting states of mind bordering on insanity. In the morbid state we may best discover the proper functions of the healthy mind; as some truths are best learned by carefully investigating the antagonistic error. Observe too, how here, as in Shakspeare's dramas, the freedom of human will, the perfect law of liberty, is shewn and vindicated: no victim of irresistible fate is here; the development of the plot is shewn in the natural results of the causes in operation, and the mixed motives and feelings of humanity are manifested with perfect truth.

Maud herself, as seen in this slight sketch, appears to us as one of those bright conceptions of the poet's art which may well excite our admiration. In all the happy joyousness of early life, with an apparent unconsciousness of her own worth and beauty, she beams upon us with all the greater power, from her unpretending simplicity, so true is it, that he that is content to lose his life shall find it; and in her willingness to recognise her true mission, Maud finds her truest happiness. It may be objected that this poem has received too tragic a termination in the death of Maud, that it would have been better to have represented her as ultimately united to the man whose fate had been changed by her "gentle will:" but as in "Romeo and Juliet," Shakspeare in their death shews us the earthly suffering and ruin of the humanly noble and beautiful, which has fallen a prey to human weakness; so Tennyson, in the death of Maud, has manifested a higher conception of his art than those objectors can discover.

We must now consider the passages in which the hero denounces, with intensity of heart, the social woe he finds around him, and the aspect of those passages viewed in connection with the war which has been waged so lately, and which occupied with so absorbing an interest the public mind. We think, however, that it would be wrong to suppose that this poem was ever intended by Tennyson as the Poet Laureate's contribution to the literature of his country on the special subject of the war; for exception has been taken to it on the ground that it does not answer the expectation of what Tennyson might have done on so great a theme; we think, however, that these critics judge it from a false point of view, judging that as its essence which is in reality only an accident. We take it that Tennyson only intended to write a poem which might exhibit the mind of such a one as he has chosen for his hero when subjected to the influences which he has portrayed, and that the war is simply introduced as one incident which may fairly be alluded to among other subjects of interest at the time.

But we do maintain that the view of peace and war which is here enunciated is substantially true, and that a great lesson is here taught.



The real evil of war resides in the passions it evokes, and if these passions are manifested as keenly in a state which is pronounced to be (externally at least) at peace, there can be nothing to choose between peace and war; but, if the external war when it comes puts a check to the internal strife—not the less strife because no sword is drawn and no blood is shed—if in seeking to attain one great object all lesser and discordant aims are abandoned; if open war calls forth a spirit of devotion, of patriotism, and of self-denial, which was clouded and almost stifled in the lethargy of peace, then may the poet fairly put into the heart and mouth of his hero a desire for

“War, loud war, by land and by sea,”

as a preferable state to that of selfish, indolent peace.

When we reflect on all the benefits that have flowed to humanity from the brave perseverance in righteous war—when we remember how the Greek hurled from the shores of Europe the Persian invader whose success would have crushed civilization in the bud—when we recall the counter invasion of Asia by Alexander, and the innumerable benefits that resulted from his success—when we recollect how the onward progress of the Crescent and of Mahomedanism was stayed, till the repellent became the advancing party—when we pass in review the various struggles which history presents of war in defence of national independence or of religious faith, we may see how the state of external war might even be longed for as a higher state of being than ignoble peace; and if the philosophy be true that virtue consists in action, then the opportunity of giving practical effect to the innate idea of justice should be welcomed as an auspicious event. Truly has it been said, “it is strange to imagine that war, which of all things appears the most savage, should be the passion of the most heroic spirits. But 'tis in war that the knot of fellowship is closest drawn; 'tis in war that mutual succour is most given, mutual danger run, and common affection most exerted and employed; for heroism and philanthropy are almost one and the same.” We consider that Tennyson has displayed wisdom of the highest order in thus unfolding the true philosophy of war, and in recalling men's minds from the false glare of military triumph to that which is necessary to justify, and at the same time is sufficient to consecrate, a war—the justice of the cause which is maintained, and the results that will accrue to humanity from success.

One other subject calls for some notice at our hands; the treatment of the social questions which are raised in “Maud.” We believe that much of the hostility which this poem has evoked has been occasioned by the unpopularity of the truths so boldly proclaimed in the wailings of the hero, and by the utterance of the conviction that much evil is

found in the social state around us ; the cry is now as of old :—" Prophesy not unto us right things, speak unto us smooth things." Yet the poet has, we believe, rightly construed his task in preferring to inspire men's minds with doubt as to the absolute perfection of the age, by shewing that several of the tendencies of the day are in a diseased and false direction.

"Wretchedest age, since Time began,"  
is the reflection of the hero, and again—

"There is none that does his work, not one ;"

and how much there is in the world around to excite such trains of thought is only too familiar to every observing and thoughtful mind.

We thus find that in "Maud," Tennyson reflects in the mind of his hero the best aspirations and tendencies of his age. The amelioration of social wrong is a subject for the deepest contemplation, and one which, at the present day, occupies the thoughts of the most acute minds, and the hearts of the most philanthropic of our fellow-men. If the poet has succeeded in keeping alive a desire to improve this state, and thus helps indirectly to its attainment, he has conferred a benefit which ought to be acknowledged and appreciated.

We trust we have succeeded in shewing that there is a deeper meaning and a higher purpose in "Maud" than some have been willing to discover ; that great and necessary truths are here taught, with an earnestness and a potency which may well excite our highest admiration. We find the ordinary personages of daily life chosen as the illustrations of the general law—that man is best enabled to accomplish his duty by learning to love the beautiful and the good, and that he finds the fulfilment of his mission in combating with moral evil within, and material evil without ; we find that law manifested with a distinctness which attests the power and earnestness of the writer—we find in the space of this short poem many passages of exquisite truth and beauty in themselves, though it has been less our task to dwell upon individual beauties than to endeavour to explain the object and tendency of the poem ; and finding these, we do not hesitate to proclaim our conviction that Tennyson has here afforded us another beautiful instance of those powers with which he is endowed, devoted, as before, to the instruction and elevation of his fellow-men. Many there are at the present day who find the expression of their hopes and longings in the pure anticipations of the Poet Laureate, and are ready to exclaim with him—

"Ring out a slowly dying cause,  
And ancient forms of party strife  
Ring in the nobler modes of life,  
With sweeter manners, purer laws.

Ring out false pride in place and blood,  
 The civic slander and the spite ;  
 Ring in the love of truth and right,  
 Ring in the common love of good.

Ring out old shapes of foul disease,  
 Ring out the narrowing lust of gold ;  
 Ring out the thousand wars of old,  
 Ring in the thousand years of peace.

Ring in the valiant man and free,  
 The larger heart, the kindlier hand ;  
 Ring out the darkness of the land,  
 Ring in the Christ that is to be."

#### FOURTEENTH ORDINARY MEETING.

ROYAL INSTITUTION, May 12th, 1856.

ROBERT M'ANDREW, Esq., F.R.S., PRESIDENT, in the Chair.

Mr. T. C. Archer exhibited several coins intended to be deposited in the Museum of Science and Art, in the Royal Institution.

Mr. Morton exhibited several fossils from India, and a horn of the *Bos primogenius*, from the deluvium near Bootle.

Mr. Marrat exhibited shells from the cliff at Egremont.

Mr. Redish read an autograph letter from the Poet Laureate to a friend, referring to some obscure lines in "In Memoriam," and giving the poet's meaning.

The following paper was then read :—

#### ON THE PRESERVATION OF FRESH MEATS.

By GEORGE HAMILTON, Esq., F.C.S., F.R.A.S.

IN November of the year 1852, I was consulted by two mercantile gentlemen of Liverpool, on the practicability of bringing cargoes of beef in a fresh state, from South America into this country ; and, as the nature of my answer was likely to affect a commercial speculation, I thought it necessary to make a series of experiments, not only with

beef, but with other parts of animals still more prone to decomposition, as brain, blood, lungs, hide, &c.

Before entering fully into these experiments, it was thought desirable that I should state my opinion in writing, and shew the ground on which a hope might be founded of ultimate success. This statement was produced and read, on the 10th of March, 1853. It contained the following passages :—

Beef is liable to change from two causes, which are essentially distinct from each other :—

1st. Combination with oxygen, supplied by the atmosphere : in presence of watery vapour, the elements of the substance form gaseous products, which pass off. Chemists call this process *eremacausis*.

2nd. A change in the internal arrangement of the atoms of the substance, in some cases without the agency of atmospheric air. This change proceeds most rapidly with a scanty supply of air, and a slightly elevated temperature. The albumen of the meat decomposes, and acts as a ferment, which soon extends through the whole mass. This process is properly called *putrefaction*.

It is possible to prevent both oxidation (*eremacausis*) and *putrefaction*, by various means ; but the condition, that the meat shall be in all respects like fresh meat, in colour, consistence, and taste, and be fit for human food, surrounds the problem with difficulties.

If the meat were placed, as you suggest, in an air-tight vessel, connected with an air-pump, the air could not be completely exhausted by working the pump, however long ; and, as *putrefaction* is hastened by diminution of pressure, an imperfect vacuum would be worse than useless. But when the exhaustion is as complete as the power of the pump will allow, if a gas were introduced which would combine with the oxygen remaining in the pores of the meat, as well as that in the containing vessel, the whole of the oxygen could be withdrawn. Binoxide of nitrogen would effect this object perfectly. The vacuum thus left might be filled up with some non-oxidizing gas, such as carbonic acid, carbonic oxide, nitrogen, or hydrogen ; but as I am entirely ignorant of the effects which these gases would be likely to produce on the colour, consistence, and taste of the meat, I know of no way of answering your question satisfactorily, without entering on a long and tedious series of experiments.

The following are a few of the experiments which I made :—

#### FIRST SERIES.

*Experiment 1.*—Placed six pounds of fresh beef in a box, over a layer of chloride of lime, the beef resting on a board perforated with

large holes, screwed on the lid. *Result*: After twenty-one days, opened the box; colour good, some mouldy spots on the surface, disagreeable musty odour; decomposition had commenced.

*Experiment 2.*—Filled a large bottle with chlorine; immersed, for a few seconds, a piece of beef weighing about eight ounces; after immersion, freely exposed to the air. *Result*: The beef immediately shrank in bulk on coming in contact with the gas, and assumed a disagreeable livid colour; possessed the odour of chlorine, at first very strong; odour during several days diminished in intensity; at the end of twenty-one days, smell very disagreeable—a mixture of chlorine and the gaseous products of decomposition.

*Experiment 3.*—Placed a piece of beef in a bottle of chlorine, and kept it fourteen days carefully stoppered. *Result*: At the end of fourteen days had greatly diminished in size, was tough, had a dark livid colour, strong odour of chlorine; after free exposure to the air for twenty-one days, it became dry and hard; did not putrefy.

*Experiment 4.*—Confined a piece of beef of about eight ounces in a stoppered bottle of ammonia. *Result*: It gradually darkened in colour, and became so soft that when moved from place to place within the bottle, it readily assumed the form of the surface of contact; when taken out at the end of fourteen days, it was very soft, smelled strongly of ammonia, and soon dried up to a hard shining mass without putrefying.

*Experiment 5.*—Placed a piece of beef, of about eight ounces in weight, in a stoppered bottle, supporting the beef on a piece of wood thrust through it; filled the bottle with binoxide of nitrogen. *Result*: At the end of twenty-one days the colour not changed; faint odour of nitrous acid; appeared perfectly fresh and good.

#### SECOND SERIES.

*Experiment 1.*—Placed a piece of beef weighing about six pounds, in a large glass jar, supporting the beef on the point of an inverted glass funnel, the broad end of which rested on a deep plate, on which the glass jar was inverted; filled the jar with binoxide of nitrogen. *Result*: The exuding juice dropped into the plate, forming a scum on the surface of the water, and a white fatty-looking substance which sank. At the end of twenty-eight days the water had an excessively offensive odour; took out the beef at the pneumatic trough, without removing the gas; found it perfectly fresh; replaced it in the jar, and added fresh water. During three months the water gradually rose in the jar; it was then necessary to add more binoxide of nitrogen. At the end of 150 days the meat was taken out. In colour and consist-

ence it was almost indistinguishable from fresh-meat; the colour was slightly paler, owing no doubt to the action of the water in which it had been frequently immersed. It had a faint odour of nitrous acid. It was cooked by boiling, the water being changed three times during the process, and the boiling continued three hours and a-half. In colour and consistence not distinguishable from fresh-meat cooked in the same manner. Taste tender and good; fat particularly fine. A piece of the uncooked meat left freely exposed to the air, dried up in twelve months, to a hard, brown, shining mass, contracting very much in size. A few mouldy-looking spots appeared on the surface; did not putrefy. A piece of the cooked meat freely exposed to the air, was fly-blown, and in ten days decomposition had commenced. The water in which the meat was boiled had an odour of nitrous acid.

*Experiment 2.*—Placed a piece of lungs in a stoppered bottle, and filled up with binoxide of nitrogen at the pneumatic trough. *Result*: At the end of thirty-eight days, colour a little deeper red; slight odour of nitrous acid. Offered to a cat, but refused; when offered after being boiled, immediately eaten.

*Experiment 3.*—Prepared a similar bottle, to be kept in a place shaded from light, and at a temperature varying from  $70^{\circ}$  to  $76^{\circ}$  Fahr. *Result*: Colour not changed. In other respects as in Exp. 2.

*Experiment 4.*—Prepared another bottle, to be kept at a temperature varying from  $76^{\circ}$  to  $93^{\circ}$  F., with full exposure during the day to the light of the sun. *Result*: Colour changed to a dark red in a few hours when exposed to the direct light of the sun. After sixty days, much diminished in size. When exposed to the air, it dried up to a hard mass without putrefying.

*Experiment 5.*—Placed in a bottle of binoxide of nitrogen, a quantity of brain tied up in a sheep's bladder. *Result*: At the end of forty-eight days, unchanged in appearance; slight odour of nitrous acid.

*Experiment 6.*—Treated a quantity of blood in the same manner. *Result*: As in Experiment 5.

*Experiment 7.*—A quantity of blood with a putrid odour, was treated in the same manner. *Result*: The bad odour remained unchanged.

*Experiment 8.*—Placed a piece of fresh hide in a jar of binoxide of nitrogen. *Result*: After seventy days, free from taint; skin much thickened, hair loose, and colour changed. Brown hair had become yellow. When exposed to the air, the skin dried, hardened, and contracted; did not putrefy.

*Experiment 9.*—Placed about four ounces of beef in a bottle of binoxide of nitrogen, supporting the beef on a piece of wood thrust through it: kept the bottle at a temperature varying from  $76^{\circ}$  to  $93^{\circ}$  F.,

fully exposed during the day to the direct light of the sun. *Result* : After ninety days the meat had lost about three fluid ounces of liquid : size much diminished ; colour lighter red. When cooked by roasting, became very compact ; taste harsh and sour, with nothing of the flavour of roast meat.

### THIRD SERIES.

The object of this series of experiments was to ascertain the effects of each of the following gases :—Nitrogen, protoxide of nitrogen, binoxide of nitrogen, carbonic acid, carbonic oxide, and hydrogen. The meat was weighed for the purpose of ascertaining the quantity of juice which exuded in each case. It was intended further to ascertain the quantity of gas absorbed by the meat kept in binoxide of nitrogen, and whether any and what gas was generated in the others.

#### *Experiments :—*

1. Placed 4 ounces of beef in a bottle (50 c. in.) of nitrogen.
2. „ 5 „ „ „ protoxide of nitrogen.
3. „ 4 „ „ „ binoxide nitrogen.
4. „ 4 „ „ „ carbonic oxide
5. „ 8 „ „ „ carbonic acid.
6. „ 7½ „ „ „ hydrogen.

After twenty-three days, found the following results :—

1. Colour dark brown : odour musty.
2. Meat soft, dark brown colour, musty odour.
3. Natural colour unchanged.
4. Colour beautiful light red, quite fresh.
5. Colour dark brown ; meat fresh.
6. Colour very dark brown, with spots of green ; odour very bad.

These experiments were interrupted by an accident. They were repeated, but without previous weighing. At the end of forty-two days all were tainted except the piece in binoxide of nitrogen.

### FOURTH SERIES.

The object of this series of experiments was to ascertain the effects of mixtures of different gases, particularly with the view of ascertaining whether atmospheric air, deprived of its oxygen, could be employed as one of the ingredients, and, in admixture with it, the minimum quantity of binoxide of nitrogen which would suffice to preserve the meat from decay.

Placed ten pieces of beef, each four ounces, in stoppered bottles containing the mixed gases, and after thirty-seven days examined the contents.

*Experiment 1.*—4 vols. nitrogen, 1 vol. carbonic acid, 1 vol. binoxide nitrogen. *Result*: Colour brownish red; musty odour.

*Experiment 2.*—4 vols. nitrogen, 1 vol. carbonic acid, 2 vols. binoxide nitrogen. *Result*: Colour and odour good.

*Experiment 3.*—4 vols. nitrogen, 1 vol. carbonic acid, 4 vols. binoxide nitrogen. *Result*: Appearance extremely good; faint odour of nitrous acid.

*Experiment 4.*—4 vols. carbonic acid, 1 vol. binoxide nitrogen. *Result*: Colour and odour good.

*Experiment 5.*—2 vols. carbonic acid, 1 vol. binoxide nitrogen. *Result*: Colour and odour good.

*Experiment 6.*—1 vol. carbonic acid, 1 vol. binoxide nitrogen. *Result*: Similar to Experiment 5.

*Experiment 7.*—1 vol. carbonic acid, 2 vols. binoxide nitrogen. *Result*: Colour good; slight odour of nitrous acid.

*Experiment 8.*—1 vol. carbonic acid, 4 vols. binoxide nitrogen. *Result*: As in Experiment 7.

*Experiment 9.*—1 vol. hydrogen, 1 vol. binoxide nitrogen. *Result*: Colour good; faint odour of nitrous acid.

*Experiment 10.*—1 vol. hydrogen, 2 vols. binoxide nitrogen. *Result*: As in Experiment 9.

*Experiment 11.*—Filled a stoppered bottle with binoxide of nitrogen, and thrust into it as much beef as it could contain, the interstices probably not amounting to more than one cubic inch in a bottle of twelve fluid ounces capacity. *Result*: In six days a number of extremely small gas bubbles appeared in the film of liquid which was enclosed between the meat and the side of the bottle. At the end of twenty-eight days the stopper was forced out of the bottle. The meat was tainted.

#### CONCLUSIONS DRAWN FROM THE PREVIOUS EXPERIMENTS.

I. The fumes of chloride of lime will not prevent the putrefaction of beef.

II. Chlorine gas prevents putrefaction, but it cannot be employed to preserve flesh-meat intended for human food.

III. Ammonia cannot be employed to preserve meat. It prevents putrefaction, but it imparts to the meat a repulsive appearance, consistence, and odour.

IV. Binoxide of nitrogen preserves beef from putrefaction without changing its colour or consistence. When the fibre of the meat is cut, the gas is absorbed rapidly into the pores and the juice exudes. The quantity of juice lost is great when the volume of the gas bears a large



proportion to the volume of the beef, and the loss is augmented by exposure to light. The loss is least when these conditions are reversed; but when the volume of the beef bears a very large proportion to the volume of the gas the beef will not be preserved at all.

V. When beef is kept in binoxide of nitrogen a sufficient length of time to coagulate the albumen, it does not afterwards putrefy when exposed to the air.

VI. Lungs, brain, or hide, when kept a sufficient length of time in binoxide of nitrogen, will not afterwards putrefy on exposure to air.

VII. Nitrogen, protoxide of nitrogen, carbonic oxide, carbonic acid, and hydrogen cannot be employed to preserve meat from putrefaction. Of all the gases named in Series 3, binoxide of nitrogen alone preserves the colour and consistence of the meat unchanged.

VIII. No conclusions of any practical value can be drawn from the fourth series of experiments, since the preparations were not kept a sufficient length of time. The results seem to indicate that the action of binoxide of nitrogen would not be impaired by a certain proportion of nitrogen or carbonic acid. Future experiments must determine the best proportion of the gases for such a mixture, the minimum quantity for a given quantity of meat, the length of time during which it must be immersed, and, finally, whether such preserved meat can have any commercial value.

Although these experiments were interesting in a scientific point of view, and were attended with some degree of success, yet they were not of such a nature as to justify me in recommending a trial of the process on a large scale. The high price of the materials required for making the gas, the necessity of sending such materials to the country from which the meat was to be imported, the impossibility of procuring in those countries persons sufficiently skilful to manipulate with gases, were considerations not to be overlooked. I reported accordingly, and was liberated from the engagement into which I had entered.

The experiments were made the subject of a paper which I read at the meeting of the British Association at Liverpool, in September, 1854. A very imperfect and inaccurate notice of the paper appeared in the Report of the Association, and in some of the scientific periodicals. The Abbé Moigno was present in the chemical section when the paper was read, and requested a copy of it for insertion in his "*Cosmos*." I wrote a copy *in extenso*, and sent it to the Abbé at Paris. The receipt of this paper was not acknowledged, and no notice appeared in the *Cosmos*.

On the 20th January, 1855, and again on the 5th April, I wrote to the Abbé, requesting him to insert the paper as he had promised, or, if

he had not space for the whole, to insert a short abstract or some notice of it. I received no reply. I next wrote to Mr. T. C. Archer, requesting him to use his influence to procure from the Abbé some acknowledgment of the receipt of the paper. This service Mr. Archer very kindly and promptly performed, and on the 18th June I received the following letter :—

MON CHER M. HAMILTON,

Dernièrement dans une petite lettre qu'il m'a écrite Mr. Archer, me rapploit la promesse que je vous avais faite d'inscrire l'intéressante série d'expériences que vous avez faites sur la conservation des viandes fraîches. Je voulais en achever enfin la traduction aujourd'hui et j'étais en train de le faire lorsqu'à mon grand chagrin je me suis aperçu que le manuscrit, tel que je l'ai retrouvé, à mon retour de Londres, était incomplet, la seconde feuille, contenant les pages 5, 6, 7, 8, depuis la première expérience de la seconde série depuis ces mots, *and a fatty looking substance which sank*, jusqu'à ces mots de la troisième série, *experiments on the quantity and in different gases, the meat was weighed*, en manque totalement.

Soyez assez bon, je vous prie, pour combler cette lacune par un des plus prochains courriers, et vous pouvez être sur que vous trouverez dans le *Cosmos* qui suivra l'arrivée de votre lettre, ma traduction complète. Elle aura beaucoup d'intérêt actuellement parce qu'un Monsieur Lamy de Clermont ferrand expose de tres curieux (?) produits animaux et vegetaux, conservés je crois par l'acide carbonique, ou l'oxide de carbon. Je serai heureux de faire reconnaître votre priorité.

L'ABBE F. MOIGNO.

16 Juin, 1855.

Samedi.

#### TRANSLATION.

MY DEAR MR. HAMILTON,

I lately received a note from Mr. Archer, reminding me of the promise which I made to you to insert the interesting series of experiments which you made on the preservation of fresh meat. I wished in fact to make a translation to-day, and was engaged with it, when, to my great annoyance, I discovered that the manuscript, such as I found it on my return from London, was incomplete. The second sheet, containing pages 5, 6, 7, 8, from the first experiments of the second series, from the words, *and a fatty-looking substance which sank*, to these words of the third series, *experiments on the quantity, &c., in different gases, the meat was weighed*, is totally wanting.

Be so good, I pray you, as to fill up that void by one of the earliest posts, and you may be sure that you will find in the *Cosmos* which follows the arrival of your letter my translation complete. It will have great interest at present, because a M. Lamy, of Clermont Ferrand, is exhibiting very curious (?) products, animal and vegetable, preserved, I think, by carbonic acid or carbonic oxide. I shall be happy to make known your priority.

16 June, 1855.

L'ABBE F. MOIGNO.

In reply to this, I wrote to the Abbé that I would feel obliged if he would insert any portion of what remained, or any notice of it in the *Cosmos*. I received no reply, and no notice appeared. I decided on giving no further trouble to the editor of *Cosmos*.

On the 13th July, 1855, an article appeared in the *Cosmos*, headed "The wonder of wonders of the Palace of Industry. Preserved meats of M. Lamy." The writer states, "A collection of products so unexpected, wonderful, extraordinary, that in order to believe in their existence it is necessary to see them with one's own eyes and touch them with one's own hands. Nothing similar has ever appeared in the glorious combination of science and art. The brilliant conquest of M. Lamy would alone suffice to render the exhibition of 1855 memorable among all exhibitions. We have seen, we have touched, and yet we doubt in spite of ourselves, because our mature intelligence refuses to permit itself to be carried away with the accounts of fairies which amused our infancy. How, in fact, can one after fifty years of age admit the reality of the mysterious being who, after having plunged his beautiful *protigées* in a sweet and profound sleep, surrounded her with delicate meats and delicious fruits which should after a hundred years charm her when she awoke.

"M. Lamy; Licentiate of the Physical and Mathematical Sciences, Professor of the University *en congé illimité*—one of the most elevated, penetrating, intelligent, and active men we ever met with—after five long years of trials and experiments, starts forth as a giant, astonishing the world by one of those strokes of power which formerly would have immortalized their authors. He has discovered the secret of preserving in their natural state—without drying, without compression, without previous cooking, without hermetically sealing, in open space—all the most fermentescible and decomposable substances of nature, meat, game, roots, fruits, butter, milk, everything, even the barm of beer, the most instable of ferments. Approach the modest, the too modest case of the modest Auvergnat." Then follows a description of the articles—legs of mutton, cauliflowers, grapes, apricots, peaches and plums, oranges, medlars, butter-pears, partridges, &c. &c. all in the most perfect state of preservation. The writer states that, "the decomposition and putrefaction of animal and vegetable substances commence by the fermentation of an albumenoid principle, the nature of which it is necessary first to modify by precipitation or coagulation, by the action of a gas properly selected." For the fruits "M. Lamy has recourse to certain salts analogous to proto-sulphate of iron, or protochloride of copper."

The article concludes thus:—"Meat is scarce and dear in Europe, but abundant in Texas, Canada, and in various countries of the new world; from these places it is already imported in considerable quantities, but it is always necessarily in the salt state; that is evidently but an incomplete solution of the grand problem. The veritable solution is that of M. Lamy, who has the happy claim of having brought within

the reach of even the poor man at a low price, beef, pork, game, fresh and delicate, from the favoured banks of the great American rivers."

We have no right to expect a description of a patented process, either in a public journal or in a private letter, but we must demur to the explanation offered by the editor of the *Cosmos* as inconsistent with known chemical facts. Neither carbonic acid nor carbonic oxide will prevent the putrefaction of meat. Nor will the presence of proto-sulphate of iron, or any other analogous salt, in the way described, prevent the decomposition of fruit.

I wish it to be distinctly understood that I bring this subject forward at present in compliance with the request of the secretary, and some members of the Council, of the Literary and Philosophical Society, who have observed the experiments, and regard them as important, but not with a view of setting up a claim to priority. If M. Lamy has done all that is described in the *Cosmos* he has indeed accomplished a "wonder of wonders," which casts into the shade my comparatively imperfect experiments. Under these circumstances, a claim on my part to priority, grounded on the mere fact of publishing first, would be simply ridiculous. The expression "je serai heureux de faire reconnaître votre priorité" in the Abbé's letter is his own voluntary offer, for which I am in no way responsible.

It would afford me great pleasure to see the preparations of M. Lamy, and to congratulate him personally on the brilliant results of his experiments. It is gratifying to me to know that I have been engaged in the same field of research, guided by the same kind of reasoning, and although, apparently, with greatly inferior success, using, probably, the same means to accomplish the same ends. It would have been an additional gratification if the editor of the *Cosmos*, who had my papers so long in his possession before writing his eulogium on M. Lamy's labours, had, even incidentally, made allusion to mine.

This paper was followed by one on "CONSTANTINE PALEOLOGUS, THE LAST OF THE BYZANTINE EMPERORS," by Charles Millward, Esq., who furnished an interesting description of the events preceding the conquest of Constantinople by the Turks, in 1453. He dwelt at considerable length upon the private career of the last Greek Emperor, and pointed out various errors and omissions by our native historians.

Mr. Towson offered some laudatory remarks, and informed the meeting that he had witnessed the exhumation of the body of Theodora, the last descendant of the Palæologi, who had married an English gentleman, and spent her remaining days in a small town in Cornwall, where her body lies buried.

## FIFTEENTH ORDINARY MEETING.

ROYAL INSTITUTION, 26th May, 1856.

ROBERT M'ANDREW, Esq., F.R.S., President, in the Chair.

Sir John Salusbury, on being admitted a Member, exhibited the original diploma which had been presented to him when he was formerly enrolled in the Society.

Mr. Newton Samuelson, F.C.S., was elected an Ordinary Member.

It was announced that the Natural History Excursion would be to Llandudno, on the 7th of June.

Mr. T. C. Archer exhibited several specimens of malachite, illustrative of its supposed stalagmitic and stalactitic origin; also several skeletons of birds, fishes and reptiles of exquisite beauty, prepared by maceration and the action of the sand-hopper. Mr. Marrat exhibited several local mosses; Mr. Henry Duckworth a remarkably fine specimen of the tooth of the Labyrinthodon; Mr. Nisbet, several Chinese coins; and Mr. M'Andrew, a fine specimen of the Scammony root.

The following paper was then read:—

## A GEOLOGICAL RAMBLE.

By EDWARD BRETHERTON, Esq., F.G.S.

Go forth into the country,  
 From a world of care and guile;  
 Go forth to the untainted air,  
 And the sunshine's open smile.  
 It shall clear thy clouded brow—  
 It shall loose the worldly coil  
 That binds thy heart too closely up,  
 Thou man of care and toil!

MRS. JAMES GRAY.

It has long been matter of surprise that persons having opportunities for cultivating science, without infringing upon their ordinary duties, neglect them. This is more singular when we consider the omission inflicts a double injury—on the mental and the bodily powers. We exert ourselves to procure for the over-worked artisan and labourer a relaxation from toil; would it not be equally wise and prudent to extend our philanthropic efforts to ourselves, and those toiling at the

desk, or engaged in the thousand varied and wearying occupations for the accumulation of wealth.

Many sciences combine and call forth in their pursuits energies conducive to health ; and the one for which I seek to enlist disciples ranks second to none in this grand desideratum. What more exhilarating than the field pursuits of the geologist ? What more companionable ? In the bright fresh morning he hastens to his labours. He woos nature in all her forms, and in all the wondrous diversity of her beauty. The stern features of the early world are pleasing contrasts to the softened landscape evidences of the younger formation. The sandy desert he knows to have once been the depths of the bright green sea, and the loftiest mountain the habitat of the world-creating coral. He seeks and finds in the relics and debris strewn around him evidences of life, oftentimes most wondrous in its formation, but long past away. But he knows that all are links in that great chain that encircles time ; materials that form the base of that mighty pyramid, the apex of which is still a mystery.

The study and applicability of this science has yet scarcely been fully appreciated. The architect and his handy craftsman, the mason, are too palpably indebted to its aid for useful and important lessons to render details necessary. Another large and most influential class of men may gather information to guide their judgments from its teachings : I mean the medical profession. In ordinary physical and pathological treatment, the geological structure of localities, where the patient resides or resorts, must in many cases be of vital importance. Some formations, by their stiff clays, retain the moisture near the surface, thereby causing an excess of damp and cold ; another is peculiar for its dryness, retaining heat, and thereby keeping up a more even temperature. Some evolve gasses deleterious to many constitutions, perhaps medicinally beneficial to others. In the same manner we find in some strata elaborate mineral waters possessing certain medicinal properties, which, if properly understood and rightly applied, often reinstate health and re-invigorate the constitution. To have a sound knowledge of temperature and other ruling influences, radiating as it were therefrom, is a knowledge, I apprehend, exceedingly desirable, if not absolutely necessary, for the medical practitioner.

But of all sister sciences and tastes benefiting by the study of geology, there is one which is largely indebted to it, and that is painting. What master-hand should depict the iron-fronted and timeworn frowning masses of the older rocks, rearing their heads hoared with the snows of almost immeasurable time, in a locality where only the gentle undulations of the new red, the oolite, or chalk are

developed. Nature has her frame-work and dress for her several ages, and the artist who neglects this study of her must soon display his want of a most necessary knowledge of his art. Much that geology teaches is appreciable without any profound knowledge of the science, and as I may not expect all I address to have made it their peculiar study, I shall seek to render my observations interesting to the many rather than the few. I am but a pioneer to localities others may visit, who, by their more minute and scientific details, may fill up the great hiatus my inability and cursory survey must necessarily leave.

I have selected as my present ramble localities easily approachable, offering considerable diversity as a geological field, variety in its minerals, and much interest in its historical records.

Before proceeding with our survey, I must request permission, for the benefit of those not geologists, to give an outline of the formation we are about to visit. In England, and in most quarters of the globe, there is a great and extensive formation comprised of sands, clays, free-stones, shales, seams and bands of coal, alternating with gritty sand-stones; limestone generally forming the basement: this formation, wherever developed, has a striking similarity in its lithological character, arrangement, and wonderful fossil flora: it is known as the carboniferous series. Underneath, when conformable, we have variously disposed beds of yellow and red sandstones, often appearing as flags or tiles, stones, marls, or rather clays, differently coloured, interstratified with a concreting limestone called "cornstone," and in some parts a conglomerate called "pudding-stone."

This formation is said in some localities to extend 10,000 feet in thickness, but in this respect it is exceedingly variable. Originally, from the prevailing colour, these beds were called the "old red sandstone," (to distinguish them from the "new red,") the lowest of the mesozoic group; latterly they have been re-named "Devonian," from their being largely developed in Devonshire, but to my mind the old name is more appropriate and significant, and I shall therefore adopt it.

To the labours of Hugh Miller is due the interest attached to this formation. Previously to his discovery of its ichthyolites it held a doubtful and indefinite position; now, few afford better evidence for a distinct and definite classification. Its stratification is exceedingly variable, and sections, as developed in Scotland, and North and South Devon, show little similarity.

The palæontologist, however, here interposes, and the evidence afforded by disembodied organisms proves the position; for however variable may be the arrangement, nay, to a certain extent the composition, of a geological structure, the contemporaneous existence of its fossils is conclusive proof of its identity for the purpose of classification.

The lithological texture points to the materials used—the debris of disintegrated older rocks. Its diversity of structure results from the varied influences under which the materials were re-assorted and consolidated in seas of varied depth, and subject, more or less, to the action of currents. Comparing the old and the new red sandstone, you find little if any difference either in the materials or colour; the new is, in fact, oftentimes a mere re-arrangement of the old, and without the aid of the palæontologist we could not classify them.

On a fine May morning I sallied forth to break ground in a small field or patch of this same old red, lying below a farmstead called Tyddyn Calchwyn, about a mile from Ruthin. The old red! what fresh and vivid pictures the name recalls! What geologist can hear it without his mind at once recurring to the exquisite delineations of its world, revived by the master hand of the young stone cutter, Hugh Miller, a child of nature's own forming in ideas and education; he, as I before remarked, by his researches, classed it as a distinct formation. His lessons, so truthful, yet so wondrous in the facts they disclose, have taught to thousands that great lesson to "look through nature up to nature's God." He has built up from geology, and opened wide to the world, a temple wherein is displayed the order, power, and wisdom, wondrous yet comprehensible, of the Mighty One of old. From rocks and stones, and the relics of the dead of past time incalculable, he has taught lessons in the open fields which the temple-canopied minister cannot in truthfulness or eloquence excel.

Pardoning my attempting a tribute to this master mind, we will proceed with our ramble. The old red in the locality selected appears to lie unconformably as a selvage to the silurian, treading north-eastwardly. It runs in a zig-zag direction for a distance of about two miles, then disappears below the silurian, and re-appears at a distance of about four miles, still retaining relatively its original shape, bearing, and position. It nowhere exceeds in breadth half a mile, and frequently narrows to a few yards. Two low truncated mounds of limestone, both standing apart from the main bed, form as it were the portals through which we enter upon it. It is the nearest specimen of this formation, I think, to our present locality; and, although small, is worth examination, from its general typical conformation. It here lies in detached and insular patches.

Entering upon it at the south-east end, where its width is only a few yards, you will follow the course of a mountain stream which has cut its way through its centre, and by its ceaseless wear formed a miniature ravine—

"A green and silent spot amid the hills,

"A small and silent dell."



Higher up, this busy, babbling, yet musical companion, comes tumbling headlong over Lilliputian falls, forming at the foot deep and glassy pools. The upper stratum of this dell or ravine, which ever you please to name it, is bordered throughout its whole length with beech, elm, poplar, and hazel, whilst the primrose, hyacinth, harebell, and cuckoo pint, with other flowers, peep over the margin, either listening to the music of the busy brook, or watching the operations of inquisitive geologists, who, with noisy hammer, chance disturb the quiet of their retreat.

On entering on an examination of this bed, you first find the stream cutting its way through a series of soft unctuous red marls; but, proceeding onwards, the red marly shales are raised by the upthrow of underlying rock, which here appears from underneath. The formation rises a few feet above on the west side of the stream; following its course you come to a conflux of two streams, one running from the eastward, and the other northwardly, meeting almost at right angles. Taking the one trending northward, you soon observe the character change; large boulders intersect the ravine, the sides rise higher, the rocks protruding from the banks are sharp and jagged, the stream flows over large flat surfaces formed by slabs of deep blue shales, and these alternating, altering only in their position, you come to where the disturbance has so raised the level as to occasion a miniature waterfall; from the confluence to this point the stream has been cutting through the silurian shales, the old red having turned eastwardly at the junction. Returning back and proceeding up the stream running eastwardly, we find a repetition of red shaley rocks in places hard and untractable; others shaley, soft, and unctuous; the latter alternating in bands. For a short distance the stream cuts through the old red entirely, but afterwards it appears to have selected the junction of the two formations for its course, the right bank being formed of the dark blue shales of the silurian, and the left of the old red; and so singularly arbitrary appears this line of demarcation, that the boulders with which the bottom is strewn are pretty evenly divided between the two characteristics. At one point the old red rises on the right side perpendicularly to about twenty feet, where we have a section of the following alternations: under the alluvium a stratum of red shales, fractured and weather worn, arenaceous, exceedingly brittle, and with apparently very little if any argillaceous matter to blend them together; then follows a band of stiff blue marls, or rather clays, underneath; another bed or stratum of the upper shales, which is underlaid by a band of yellow and red shales of about two feet in thickness, all resting on a substratum of red rock, the upper part shaley and much mottled in bands, the lower solid and

hard in the fracture. It was at this point, whilst hammering and working to discover some solitary relics of the past, I was accidentally elevated to the highest pitch of fame, expectant only to be sensibly reduced to my more fitting place and level—that of the ordinary crowd. Most desirous of spreading the scientific fame of our society, I had hoped to have secured by my labours some unique specimen of this interesting formation, and whilst engaged in this (at least praiseworthy if not successful operation), I drove the pick point of my hammer in what I thought a desirable specimen of the rock, and by dint of leverage opened a large fissure and separated a block from the mass. Before taking it down, happening to look into the opening, I saw something with the broad back, which I might take for a trilobite, or toad, or bat; all three I knew were unknown in this formation, but the latter, if fossil, would, by one fell swoop, destroy the orthodox creed that mammals were long posterior to the early fish. Alas! my hopes, like thousands of others, were delusive; my captive was not a fossil, but a dormant bat. By what lateral fissure he had obtained entrance into this solid bed I could not discover, but having placed him in my hat, the heat revived him, and he soon gave ample proof that his sleep, whether of untold time or only since the previous sun-rising, had left him full of life.

Notwithstanding my disappointment I worked through the formation, supporting myself with the hope of better fortune. A little further the silurian formation crossed the stream, altering its appearance. At this point the old red lies unconformably, and is inclined, shewing two disturbances; again the old red re-appears, underlying—forming both banks of the stream; but here the clays were coloured with the blue of the silurian from above, and the alternate mixture created some singular contrasts, of which I regret, from their friable texture, I cannot give you specimens. The ravine then narrowed, and the stream having found some fissure in the silurian, made that formation its bed, until suddenly disappearing under an artificial cavity, it, with my labours, terminated. My search for fossils was unsuccessful, but the faithful delineations of the father geologist of the old red will more than compensate the loss of any isolated specimen that might have been obtained.

Before, however, passing from this portion of my subject, a few remarks on the peculiarities of the fish of this period may not be misplaced. Most are aware that the fish of the present creation are, in structure, bony within, and partly cartilaginous without. In the fish of the old red, and, in fact generally to the magnesian limestone, this arrangement is reversed, and we find them bony or osseous without, and cartilaginous within; covered externally with armour from snout to tail,

arranged in plates, bars, and scales, and sometimes all conjoined : this extraordinary outward protection has given rise to curious speculations. Fish, it is said, of all known existing creatures, are best enabled to endure high temperature. Dr. Buckland suggests that the seas of the period of their existence were of a high temperature, and consequently this armour became necessary for their existence. This hypothesis obtains support from another striking characteristic of the fish of this type, viz. the heterocercal or unequally lobed tail, which is invariably found united to the strong cuirass. It has also been remarked that, with the general disappearance of this singular structure, we find, in the lignites of the lias of Cromarty, unmistakable evidence of change of seasons, and alternations of heat and cold.

These lignites shew distinctly marked annual rings, as in the trees of present growth; but in the lignites, contemporary with the ichthyolites of this ancient type, annual rings are either absent, or faint and unfrequent; and here, says Hugh Miller, "just ere winter began to take its place amongst the seasons, the fish fitted for living in a highly heated medium disappeared; they were created to inhabit a thermal ocean, and died away as it cooled down."

I perhaps may be permitted to speculate on the causes and intents of this singular arrangement, although I do so with deference and doubt. In my observations I shall adopt what appears to me a sound mode of reasoning—analogy. It may appear that the peculiar causes or circumstances under which these fish existed in the old red are widely different from any that at present present themselves; but on consideration it must be admitted that the variation is not much, if any, wider than the flora of the coal and its present type. Now, assuming it to be true that the seas of the old red period were, at certain times, of great depth, at others shallow (during both of which this singular type existed), strewn with the enormous sharp and angular fragments of the older rocks, with the bottoms broken up and fractured by the great convulsion that closed the silurian period, would not fish frequenting such seas require an amount of protection in following their prey, different from those which frequented, or were known to exist in, some of the lake-like seas of later periods, and where the sediment was either calcareous or of an equally fine texture? Does it not strike the observer, that the head of an animal frequenting such seas, to protect it from injury, should be bony and buckler formed? The long tail in some, and the heterocercal tail in others, are evidently formed to enable the fish to strike rapidly down in deep water, and to rise with equal rapidity; and are not the heads so formed to protect them in such descent and ascent, and to enable them to root like the dog-shark

and eels of the present day—not in mud, but in the newly severed sharp angular rocks, both strewn and protruded over the seas they inhabited? I must own I cannot see why we require, to account for their forms, seas of boiling water, or a high temperature, when everyday experience and observation, and the admitted state of the medium they frequented, called forth exactly the same requisites for their safety and means of existence.

Taking up the course of our ramble from the point at which we emerged from the ravine, and pursuing a by-way for about a mile, you come to a style path, following which you are led to a farm-shed, the name of which I cannot give. In a field adjoining it, you enter on the limestone formation, as it were from the south-east side, which rises in the open field, in a ridgelike form of about ten feet elevation, close and compact in its formation, and fit for burning for agricultural purposes. Here you have a beautiful view of the silurian of Moel Fama range, and see

The hills,

Rock-ribb'd and ancient as the sun; the vales

Stretching in pensive quietness between:

The venerable woods—rivers that move

In majesty, and the complaining brooks

That make the meadows green.

Passing onward, still continuing the field path, you come to the farmstead, Pen-y-Graig. Standing on a mound outside the farm-yard, you have, stretched at your feet, the centre part of the vale of Clwyd, with its silurian background; a right line drawn from your position, cutting the centre of Moel Fama, continued, would strike the centre of Liverpool, shewing how the sea of the new red has nearly encircled it. One end of this imaginary line terminates in the midst of the haunts of men toiling in mercantile operations, the other where they are following the more even tenor of their pastoral pursuits. Both teem with life: the centre is dark and silent as eternity; it stands isolated, the image of the past; yet that lofty point once occupied the lower position of our view, and the day may come when these terminal points may take a comparatively elevated position, encircled with a desolation and silence as profound and lasting. Immediately under this mound you come upon the base of the limestone, where are worked the quarries of Pen-y-Graig.

It here again appears in one bold reef-like mass, rising on the face some hundred feet, largely charged with the exuviae of corals, encrinites, and shells. It rests in tubular masses rather than in any apparent order of stratification, and here and there you see it intersected by joints or divisional planes, which frequently, more particularly at a distance, give it a terrace-like appearance. The texture varies con-

siderably. In some places it is tough and stubborn in the fracture, whilst in others it has a much more malleable character: the top stratum of about six to eight yards is brittle and full of joints. This is used only for burning for agricultural and building purposes. Then comes a band not quite so thick, very solid, close, and compact, without joints, which is used and highly esteemed as building material; it polishes beautifully, having the nature and appearance of encunital marble: underneath is a thick bed of the character of the lop formation. The difficulty here is not to find fossils, but to get specimens devoid of some portion of them. Nevertheless it requires management to work them out satisfactorily, and you too often, for your patience, find the last blow that was to dress the specimen to your liking, destroy it by some unfortunate fracture. Whilst you are exercising your ingenuity, it will be wise to enlist the assistance of one of the miners, whose local knowledge generally enables him to point out the position of the strata where the best fossils abound; frequently they have them for disposal, and are quite able to drive a bargain with a purchaser.

Following the windings of the Clwyd, with the limestone formation in detached masses on the one hand and the new red on the other, you come on the second mound, where are worked the quarries of Llanrhaido, taking their name from the adjacent village. The aspect is so similar to Pen-y-Graig, that I shall not trouble you with details, but as the day is hot, the previous walk and work considerable, you may rest awhile, and examine with interest the church of the locality. The foundation must be ancient. There is a painted window at the east end—the subject, the genealogy of Christ—bearing date either 1508 or 28; the first would be in the reign of the 7th Henry, and the latter of the tyrant, his successor. A singular history is connected with the restoration of this window. Some few years back, a person digging in a neighbouring ravine called Nant-y-Fonan, came upon a large chest hewn out of the solid bole of an oak tree. This chest, seen in the church, is from 10 to 12 feet long by 3 to 3½ feet wide, clasped and secured with strong iron bands and immense padlocks. On opening the chest, this window and parts of another were found safely packed: and, from documents, it was ascertained that, fearing the destructive organs of Cromwell and his soldiers, (or perhaps Mytton, his general, more renowned in this locality,) it was taken out, packed in this box, and secreted in the hope of better times. The window now is like a beautiful picture set in a frame of the most outrageously bad taste that can be imagined, the modernised character of the building being something between a tithe-barn and one of our old fashioned poorhouses whitewashed, at the end of which are stuck two gothic windows, in

which the glass, so singularly discovered, is placed. The groined ceiling of beautiful oak is retained, and in a small entrance at the west end you will find parts of a beautiful altar screen, partially built in the wall, in the facings of which, however, sufficient is left to shew its character and style of carving. I observed here a singular custom. On the new made graves, planted with flowers, fine lime was strewed, which I ascertained was not used as a disinfectant, but following out a custom of which I could not obtain any explanation. On a tablet, at foot of a monument, erected in the church to the memory of one Maurice Jones, who died at the end of last century, aged 80, is the following eulogistic epitaph: "He was a gentleman of fine parts of body and mind; his conversation diverting and innocent, pleasant and instructive; his hospitality was discreet, though public; his charity unbounded and secret. The former gained him the affections of all who knew him here, and he now enjoys the reward of the latter." Leaving this resting place of one of wondrous parts, we quickly sighted the fair town of Denbigh, built on a lofty truncated mound of limestone, with its castle perched like an eagle in its eyrie. To those who may walk from Ruthin over the ground surveyed, let me advise, before mounting the ascent either to town or castle, to shift the knapsack to the easiest place, brace all tight, and proceed at a steady rate, for, after a morning's toil, to mount this ascent is no easy task, but when achieved all labour is repaid. You enter the castle through a lofty archway facing the north; there is then an inner and principal entrance through a Gothic archway, on one side of which there is still some remains of the statue of its founder, Henry Lacey, Earl of Lincoln, who lived in the time of Edward the First; he gave his vassals, as a special favour, leave to destroy all manner of wild beasts on the adjoining lordship.

The eastern or chapel side of the castle appears not to have been completed, in consequence, Leyland relates, of the Earl's loss of his eldest son, who was drowned by falling into a well in the castle yard, which accident rendered this residence distasteful to the Earl. The opening of the well is still shewn to the curious.

Leyland also relates that Edward the Fourth was besieged in this castle, and was only permitted to retire in consideration of leaving the kingdom: there does not appear much foundation for the latter assertion. In the wars of the Roses it was the scene of many deadly encounters, and it appears rather famous as the resting-place of unfortunate monarchs, for (1645) Charles the First lay here in his disastrous retreat from Chester; and in September of the same year the Royalists suffered a signal defeat just below the town, still called Battle-field. In the following year it was held from the crown by William Salisbury,

called by the Welsh "Blue stocking," why, I have not been able to discover. Old "Blue stocking," however, made a gallant defence, and held out against that famous parliamentary general, Mytton, from July to November, and then only surrendered on most honourable terms. Cromwell had a great horror of castles, and this soon followed the fate of most others, and was dismantled, and gradually became the noble ruin it now appears. There is a singular feature in the construction of parts of this castle. Both the outer and inner entrance are flanked with towers, the facing of which are red sandstone, backed up with a conglomerate mixture of lime, pebbles, and sandstone. The arches are all faced with the same material, and likewise many of the jambs and sills of the openings; one would have expected limestone—here so abundant, and the harder material—would have been selected for the purpose.

Standing on this lofty eminence, it becomes difficult to reconcile one's mind to the belief that it once formed the bed of a deep green sea swarming with life; yet all that tread the globe are but a handful to the tribes that now slumber in its bosom. In its recesses dwelt the producta, terrepratulæ, and spirifer; the corals plied their allotted tasks to form those platforms now trod by living men. You cannot strike the rock on which you stand without disintering their remains from sepulchres where they have been entombed for ages incalculable. Out of every block, relics of past periods stand in bold relief; the limestone, their matrix, worn away by long exposure. These ruined walls represent a necropolis of bygone ages. The architect and builder are past away and forgotten, but the forms of a state of things, thousand upon thousand of years anterior to the creation of man, surround you, sometimes appearing as fresh and uninjured as though entombed but yesterday.

And dance and song within these walls have sounded,  
And breathing music roll'd in dulcet strains;  
And lovely feet have o'er these grey stones bounded,  
In snowy kirtles and embroidered trains.

Such things have been.

Man taxes science to her utmost to preserve the merest outline of his fellow-creature for a few hundred years: here we find nature by her own direct and unassisted agency preserving her relics through untold ages. This castle, with its ruined walls, presents a melancholy yet instructive lesson to him who will take the trouble to read its fossil inscriptions.

The truncated mound on which the castle and town of Denbigh stand forms the terminal point of a long ridge of the limestone, extending from near Abergele. At the foot of the escarpment on the

south-east side, the sea of new red lies stretched before you, which here has worn away a pass, as it were, into the silurian, which on the north-west and south-west sides cover an extensive area.

From different points of the eminence on which the castle stands, you have stretched at your feet, or reared in masses around you, four great distinct and important geological formations. The new red, the carboniferous, old red, and silurian—the representatives of ages so incalculable that the mind refuses, or is unable to comprehend, their immensity. Here is opened a book which records more wonderful, yet still truthful, events than the most fabulous relations of Eastern allegory ventured upon. North-east and south-east you view a large field of new red; it is a good type of the formation, and apart from its geological teachings, a most enchanting view. Its softened features are brought into immediate and striking contrast with the sharp outlines of the older formations. The murmuring streams, the tall poplars, and the small and glassy-looking pools, here and there broken up with a miniature ravine, bosky dell, or rounded elevations, form the foreground to massive mountains, rent, torn, and distorted, in places divided by dark gorges, out of which rush foaming torrents, bordered by the dark yew and tapering fir. Away in the misty distance the dark cavernous openings look so deep that imagination may well picture them the entrances to a nether world.

I have said this field of new red is a good type of the formation. Survey it as it lies before you, looking upon it as a calm sea, and not a solid surface; an estuary of the great sea of the same period that overflowed Cheshire, Lancashire, and the centre of England, it is here bounded within your view, its natural position, by the rocks of the older formation, from the debris of which it is composed. The disturbance previous to its deposition had upheaved the rocks of its boundary line, between which it here lies like a lake.

Nature, as if wearied with the mighty convulsions that had rent her earlier works asunder, and almost annihilated life, now appears to have rested for a long period. Yet at times, during its depositions, there were some few convulsive throes comparatively trifling, leaving nevertheless distinct traces of their occurrence. We ascertain between the formations of the lower and upper series this disturbance took place, an epoch defined by the disturbed surface of the lower and comparatively undisturbed state of the upper. This is evidenced in our neighbourhood by the comparison of the lower formation in the Hundred of Wirral, and of the upper in the saliferous deposits of Northwich and the surrounding country. Better still in the Vosges Mountains, where



the lower strata are thrown into bold mountainous formations, whilst the upper beds are stretched hundreds of feet below them.

The field under observation would show considerable disturbance if viewed apart from the rocks with which it is surrounded, but when contrasted with them it is comparatively even.

This miniature type, if carefully surveyed, fixes on the mind a correct idea of its mode of formation, materials, and general outline. The entire series is comparatively barren in fossil remains, and this may be accounted for by three causes; one, that the previous disturbances of the earth had been greatly destructive to life; another, the want of calcareous matter as a preserving medium; and also the large amount of oxide of iron which we find pervade most of its formations. In those formations, where there is an absence of the latter and presence of calcareous matter, as in the muschelcalk of Germany, we find fossils abundant and beautifully preserved. We must be careful, however, not to place too much reliance on the negative evidence on which its barren character rests. In the old red we have an instance of the danger of such evidence, and, in the pursuit of this science, instances are too frequent to warn us against allowing this, at best but a feeble element, to guide our conclusions.

I have attempted to sketch a geological picture rather than a geological outline of the new red formation. I have adopted this course because you have had, during the present session, the details of the formation of the new red of Cheshire and Lancashire, identical in their character with the present, most ably and elaborately dealt with by our esteemed member Mr. Morton; and I cannot help remarking that the details of geology are of so peculiar a character, often so local and apart from general observation, as rather to render them interesting to the student than a general audience; and I think great praise is due to that gentleman for rendering a paper, so peculiarly confined to the difficult details I have named, so singularly pleasing.

Turning from this panoramic view, permit me, before concluding, to call your attention to a feature of geological study often overlooked. much undervalued, I mean the physiognomy of geology. In a previous part of this paper I referred to the features, peculiar formations, display, and also to the obvious assistance some professions may derive from their study. It may not perhaps have occurred to many (although remarked by writers), how intimately the character of the inhabitants of a country or locality would appear to be associated with the peculiarities of geological structure. A closer inquiry, however, reveals to us that temperament, social habits, literature, and religion of a people, are

peculiar to certain formations. Take the inhabitants of the general field of new red, including the subsequent series, we shall find them distinguished by an ordinary evenness and placidity of temperament, yet easily roused—strange, yet obvious; similar development of physical structure and carriage, and a wide code of sociality, govern their intercourse; they are, in fact, true cosmopolites. Their literature, more especially their poetry, bears within itself evident marks of this singular distinction—soft and mellifluous in its metre; its picturesque colouring mellow-tinted; the murmuring stream, the rose and the violet interwoven in its poetical garlands; all are striking evidences how much the physical features of the surrounding medium give tone to our mental productions. In religion there is an equally strong line of demarcation. To be concise on this point, I would say there is in one a peculiar stratum of materialism, in the other (the older,) an elaboration of spiritualism. Reverse the picture, and take the inhabitants of the older formations, and you there find a striking difference. In physical structure a bolder sharper outline, lofty bearing, something akin to the stern features of nature developed around them. In habits retired, silent, often approaching to churlishness; slow to passionate outburst, but when moved, like their mountain torrents, headlong and irresistible. Their poetry partakes of the character of their scenery; its imagery spiritual: whilst their religion is more than tinctured with that enthusiastical visionary typification, closely verging on what you may imagine pervaded the early world, when angels walked the earth and held converse with men.

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# ERRATA.

- Page 118, line 1, for *promising* read *premissing*.  
.. 118, .. 17, .. *me* read *us*.  
.. 120, .. 15, .. *preparation* read *precipitate*.  
.. 122, .. 12, .. *last not least* read *last though not least*.  
.. 123, .. 13, .. *тѣмъ* read *тѣмъ*.

## DONATIONS, FROM JUNE, 1855, TO JUNE, 1856.

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- 1855.—Oct. 15. *From the Society*.—Transactions of the Historic Society of Lancashire and Cheshire, vol. vii.  
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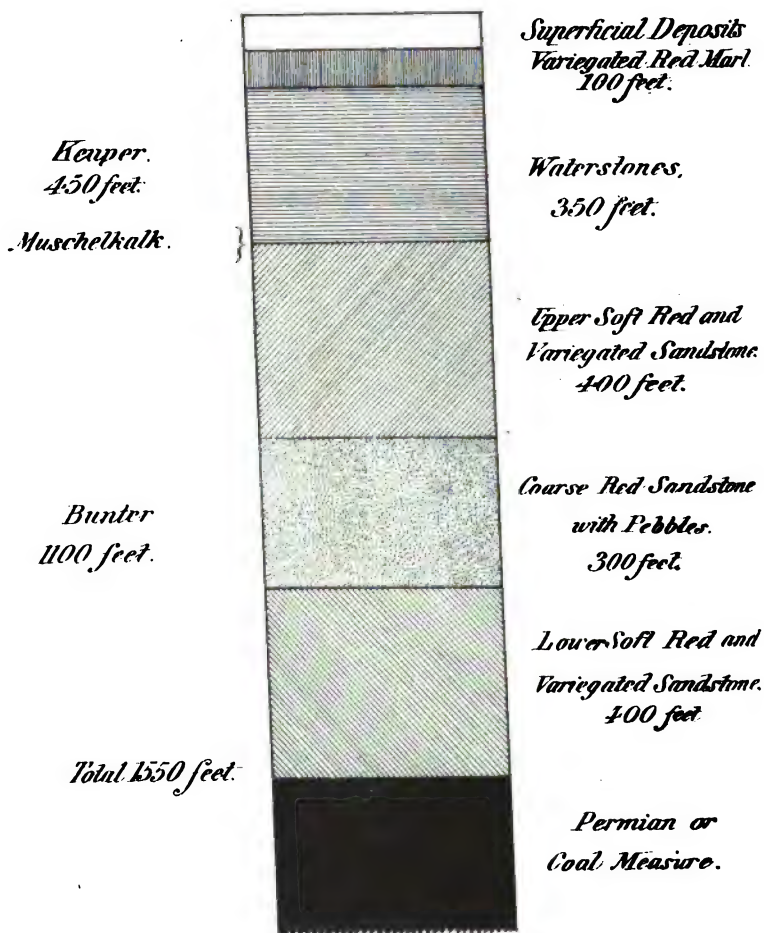
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- March 3. *From the Society*.—Proceedings of the Linnean Society, Nos. 52 to 65 inclusive.  
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- March 31. *From the Society*.—Journal of the Linnean Society, vol. i., No. 1, 1855.  
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- April 14. *From the Royal Institution, Liverpool*.—Report, 1856.  
*From the Society*.—List of Members of the Royal Astronomical Society, 1856, and Proceedings, Nos. 4 and 5., vol xvi.
- May 12. *From the Society*.—Proceedings of the Royal Astronomical Society, 1856, No. 6.  
*From the Society*.—Journal of the Geological Society. Dublin, vol. vii., parts 1 and 2.  
*From the Society*.—Twentieth Annual Report of the Warwickshire Natural History Society.
- May 26. *From the Society*.—Proceedings of the Berwickshire Naturalist's Club, vol. iii. No. 6.



# SECTION OF NEW RED SANDSTONE, LIVERPOOL.

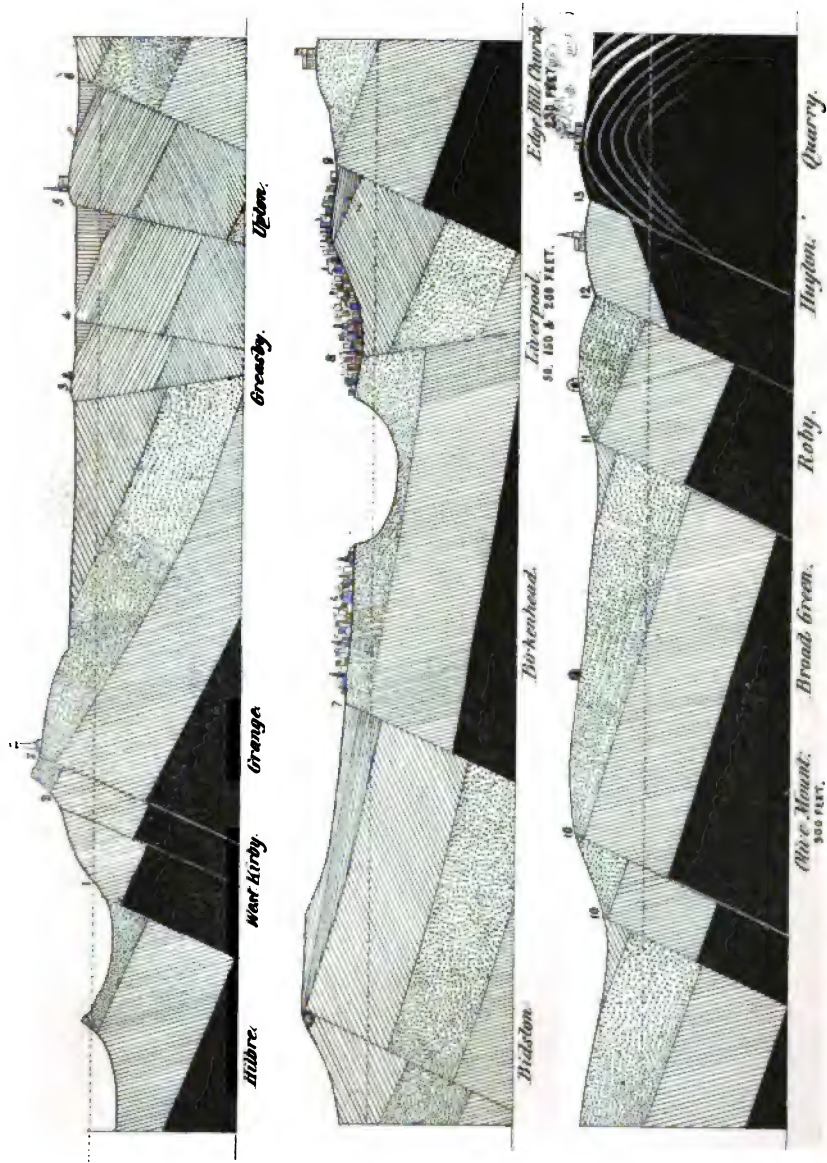
By *George H. Morton;*

*January 21<sup>st</sup> 1856.*



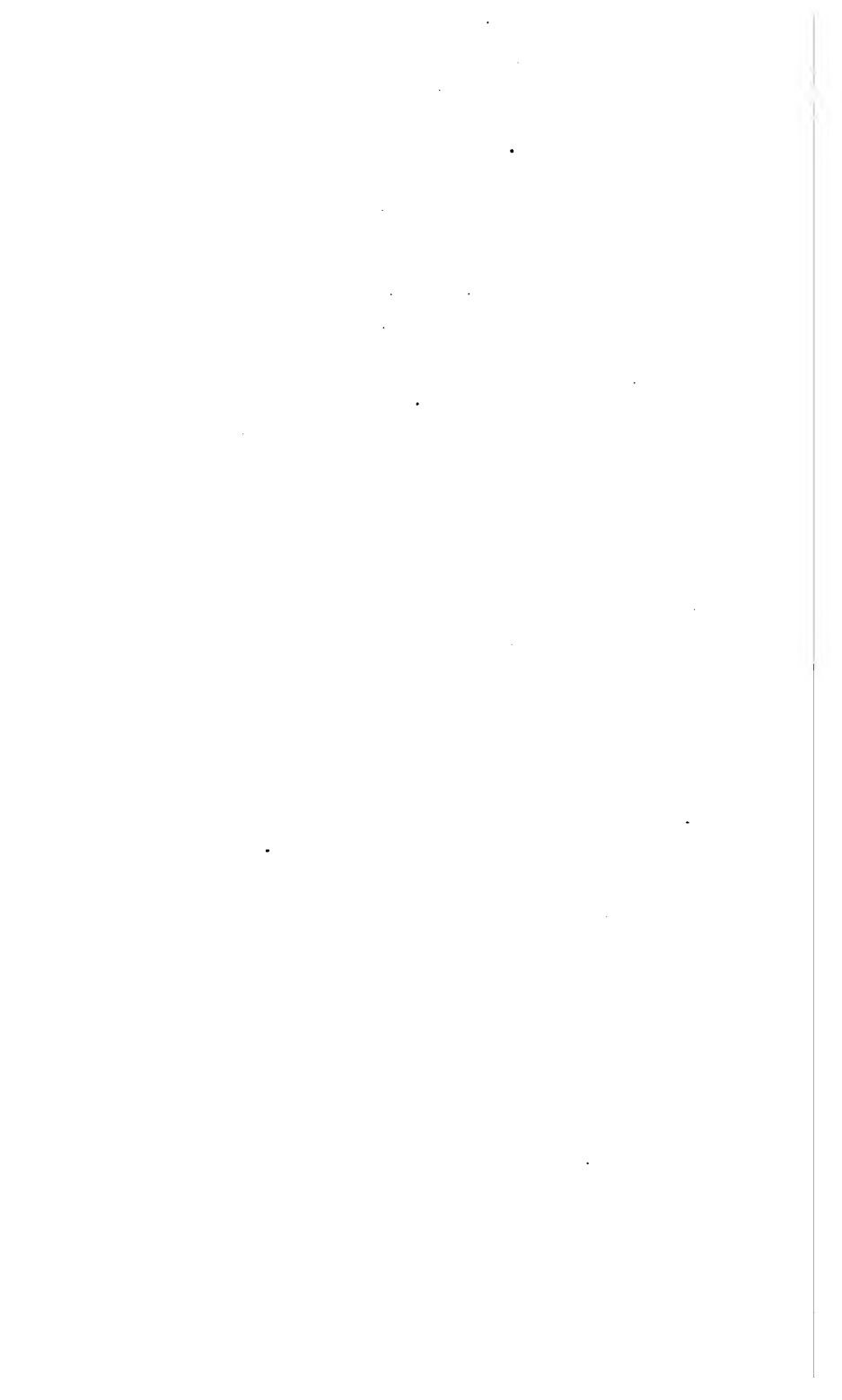
# Section of Strata from the River Dee to Huyton.

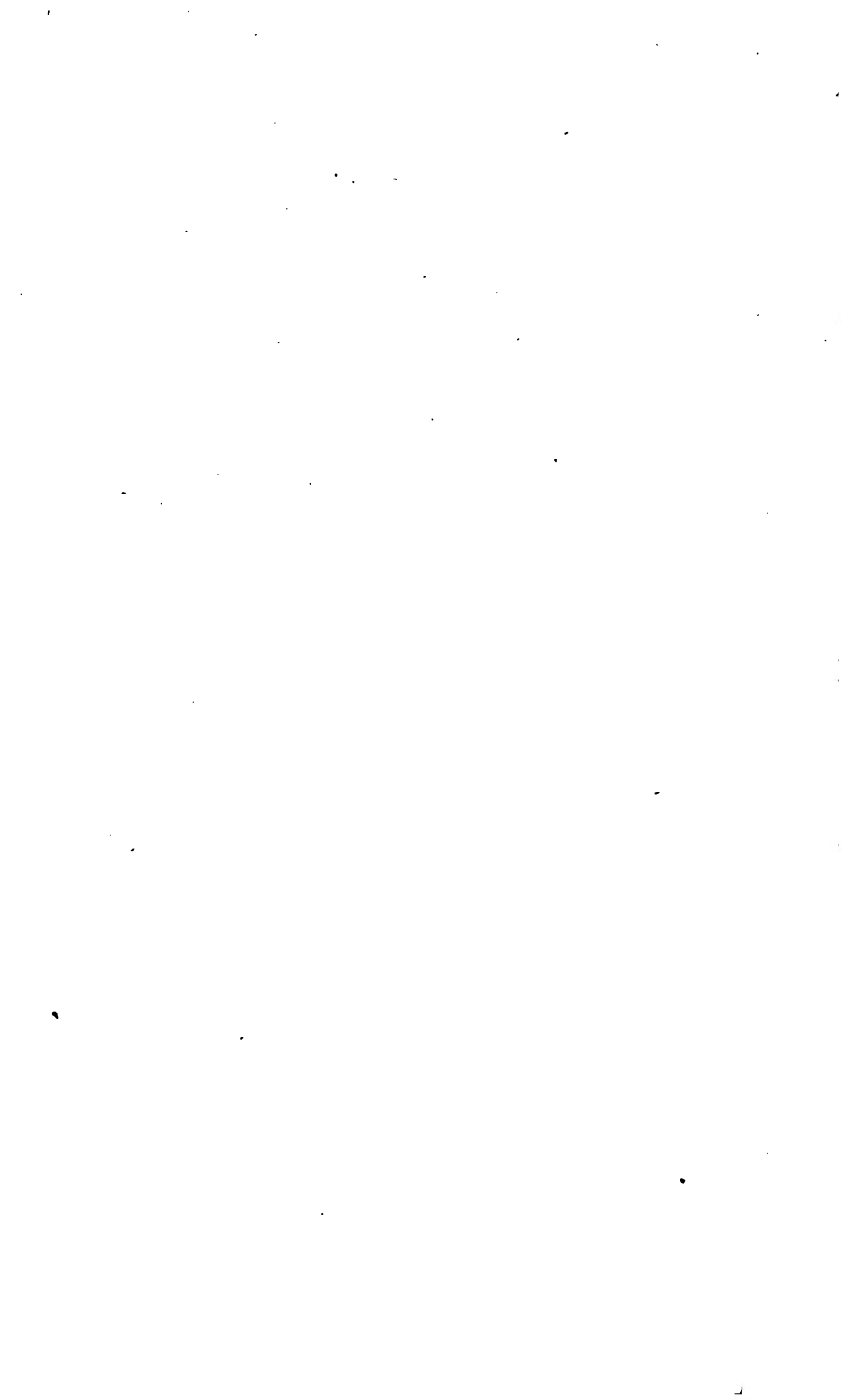
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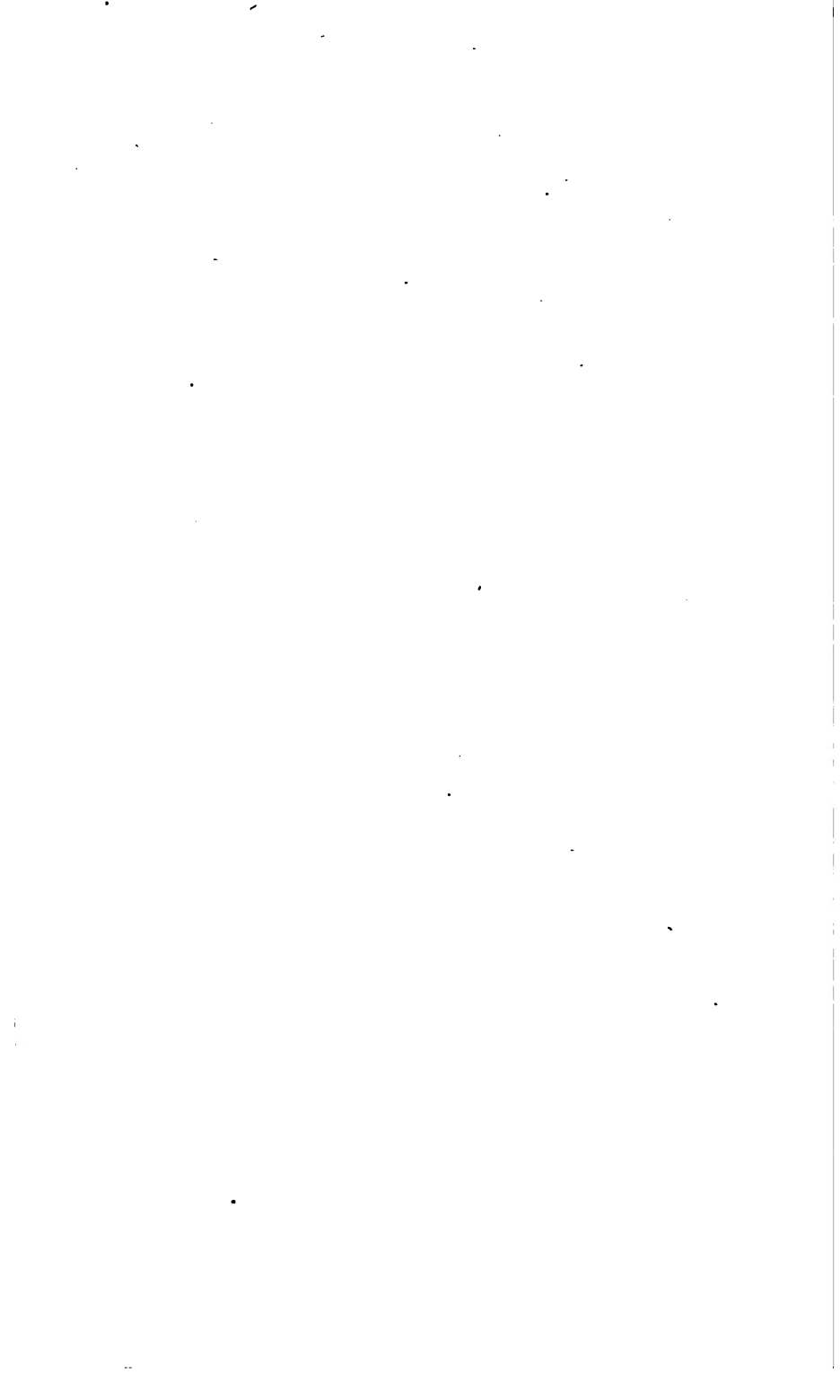


Length upon the Scale of One inch to the Mile.  
Depth . . . . . 1/4 of an inch to 100 feet.













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